



I-70 Planning and Environmental Linkages (PEL) Study

Wentzville to City of St. Louis



EAST-WEST GATEWAY
Council of Governments



OCTOBER
2018

Contents

Acronyms and Abbreviations.....	1
Executive Summary.....	1
Introduction and Study Background	1
Study Vision and Purpose and Need	2
I-70 Needs.....	3
Study Goals	4
Agency Coordination and Public Involvement	5
Agency Coordination	5
Public Involvement	6
Strategy Identification, Development, and Evaluation	6
Conceptual Strategy Screening Process and Results	8
Study Recommendations	10
Corridor-wide Recommendations.....	10
Segment-level Recommendations	12
Evaluation Criteria for Future Projects.....	13
NEPA Classes of Action	15
Independent Utility and Logical Termini.....	17
1.0 Introduction	1-1
1.1 Study Area Location and Description.....	1-2
1.2 Study Corridor Segments.....	1-3
1.3 Planning Context.....	1-7
1.3.1 State and Regional Trends Influencing Transportation Decisions	1-7
1.3.2 State and Regional Transportation Goals	1-8
1.3.3 Other Studies	1-8
2.0 Study Vision and Purpose and Need.....	2-1
2.1 Vision for the Study Corridor	2-1
2.2 Purpose of this Study	2-2
2.3 I-70 Needs	2-2
2.3.1 Safety.....	2-3
2.3.2 System Performance	2-7
2.3.3 Freight Movement	2-13
2.3.4 Physical Conditions	2-14
2.3.5 Multi-Modal Mobility and Connectivity.....	2-17
2.4 Study Goals	2-22
3.0 Agency Coordination and Public Involvement	3-1
3.1 Agency Coordination	3-1

3.1.1	Project Management Team	3-1
3.1.2	Key Influencers	3-1
3.1.3	Senior and Technical Advisory Groups	3-2
3.1.4	Agency Scoping Meeting	3-5
3.2	Public Involvement	3-7
3.2.1	Announcement/Information Distribution Methods	3-7
3.2.2	MetroQuest Survey	3-7
3.2.3	Public Meetings.....	3-8
3.2.4	Summary of Public Comments Received.....	3-8
4.0	Strategy Identification, Development, and Evaluation.....	4-1
4.1	No-Action Alternative.....	4-1
4.2	Conceptual Strategies	4-8
4.3	Prioritization of Conceptual Strategies	4-11
4.3.1	Summary of High Priority Conceptual Strategies.....	4-18
5.0	Study Recommendations	5-1
5.1	Corridor-Wide Recommendations	5-1
5.1.1	Transportation Demand Management (TDM)	5-1
5.1.2	Intelligent Transportation Systems (ITS)and New and Emerging Technologies	5-4
5.2	Segment-Level Recommendations.....	5-6
5.2.1	Segment 1 High Priority Strategies	5-6
5.2.2	Segment 2 High Priority Strategies	5-10
5.2.3	Segment 3 High Priority Strategies	5-13
5.2.4	Segment 4 High Priority Strategies	5-16
5.2.5	Segment 5 High Priority Strategies	5-19
5.3	Evaluation Criteria for Future Project Proposals.....	5-22
6.0	Anticipated National Environmental Policy Act (NEPA) Process and Considerations	6-1
6.1	Study Area Resources.....	6-1
6.2	Potential Impacts and Mitigation Measures	6-1
6.3	NEPA Classes of Action	6-11
6.3.1	Potential NEPA Classes of Action for High Priority Strategies	6-12
6.4	Independent Utility and Logical Termini.....	6-17
7.0	References.....	7-1
8.0	Glossary	8-1

Figures

Figure 1:	Study Corridor Segments.....	2
Figure 2:	Key Steps in Process to Develop Recommendations.....	7
Figure 1-1:	Study Corridor	1-3
Figure 1-2:	Study Corridor Segments.....	1-4
Figure 1-3:	Typical Cross-Sections in Each Study Corridor Segment..	1-6
Figure 2-1:	Study Corridor Vehicular Crash Rate Conditions	2-4
Figure 2-2:	Vehicle Crash Types in the Study Corridor	2-5
Figure 2-3:	Bicycle and Pedestrian Crashes in Study Area	2-6
Figure 2-4:	Westbound I-70 LOS for the AM Peak Hour.....	2-8
Figure 2-5:	Eastbound I-70 LOS for the AM Peak Hour.....	2-9
Figure 2-6:	Westbound I-70 LOS for the PM Peak Hour	2-10
Figure 2-7:	Eastbound I-70 LOS for the PM Peak Hour.....	2-11
Figure 2-8:	Location of Freight Bottlenecks on I-70.....	2-14
Figure 2-9:	I-70 Connectivity Barrier Effect in Segment 4.....	2-20
Figure 2-10:	I-70 Connectivity Barrier Effect in Segment 5.....	2-21
Figure 4-1:	Key Steps in Process to Develop Recommendations.....	4-2
Figure 5-1:	Segment 1: Illustrative Improvement Options for High-Priority Strategies	5-9
Figure 5-2:	Segment 2: Illustrative Improvement Options for High-Priority Strategies	5-12
Figure 5-3:	Segment 3: Illustrative Improvement Options for High-Priority Strategies	5-15
Figure 5-4:	Segment 4: Illustrative Improvement Options for High-Priority Strategies	5-18
Figure 5-5:	Segment 5: Illustrative Improvement Options for High-Priority Strategies	5-21
Figure 6-1:	Segment 1 Key Resources.....	6-2
Figure 6-2:	Segment 2 Key Resources.....	6-3
Figure 6-3:	Segment 3 Key Resources.....	6-4
Figure 6-4:	Segment 4 Key Resources.....	6-5
Figure 6-5:	Segment 5 Key Resources.....	6-6

Tables

Table 1:	Study Goals	5
Table 2:	High-Priority Strategies	10
Table 3:	Existing and Recommended TDM Measures	11
Table 4:	Recommendations for Implementing CV and AV Technologies	12
Table 5:	Likely NEPA Classes of Action for High-Priority Improvements.....	16
Table 1-1:	Study Area Description by Segment	1-5
Table 1-2:	State and Regional Trends Influencing Transportation Decisions.....	1-7
Table 1-3:	Other Studies Relevant to I-70 PEL Study Area	1-9
Table 2-1:	Bridges Over I-70 with Less Than 16'-6" Vertical Clearance	2-15
Table 2-2:	Multi-Modal Connectivity Across I-70 in Study Corridor ..	2-18
Table 2-3:	Study Goals	2-22

Table 3-1:	Technical Advisory Groups (TAGs)	3-3
Table 3-2:	TAG Meeting Summary	3-4
Table 3-3:	Resource Agency Coordination.....	3-5
Table 3-4:	Public Meeting Summary	3-8
Table 3-5:	Summary of Public Comments Received	3-9
Table 4-1:	Projects Included in the No-Action Alternative.....	4-3
Table 4-2:	Conceptual Strategies	4-9
Table 4-3:	Segment 1 Prioritization of Conceptual Strategies	4-12
Table 4-4:	Segment 2 Prioritization of Conceptual Strategies	4-13
Table 4-5:	Segment 3 Prioritization of Conceptual Strategies	4-14
Table 4-6:	Segment 4 Prioritization of Conceptual Strategies	4-15
Table 4-7:	Segment 5 Prioritization of Conceptual Strategies	4-16
Table 4-8:	High-Priority Strategies	4-18
Table 5-1:	Recommended TDM Strategies Study Area by Segment	5-3
Table 5-2:	Recommendations for Implementing ITS, CV, and AV Technologies	5-5
Table 5-3:	Segment 1 Bicycle and Pedestrian Improvements.....	5-8
Table 5-4:	Segment 2 Bicycle and Pedestrian Improvements.....	5-11
Table 5-5:	Segment 3 Bicycle and Pedestrian Improvements.....	5-14
Table 5-6:	Segment 4 Bicycle and Pedestrian Improvements.....	5-17
Table 5-7:	Segment 5 Bicycle and Pedestrian Improvements.....	5-20
Table 5-8:	Scoring Guidelines for Evaluation Criteria	5-23
Table 6-1:	Key Resources and Potential Impacts and Mitigation Measures.....	6-7
Table 6-2:	Potential NEPA Actions.....	6-13

Appendices

- Appendix A: I-70 Planning and Environmental Linkages (PEL) Study
Conditions Assessment Report, May 2017
- Appendix B: State and Regional Transportation Goal Summary
- Appendix C: Agency Coordination and Public Involvement
- Appendix D: Alternatives Development and Screening Details
- Appendix E: Study Recommendations (TDM Tech Memo, ITS/AV/CV
Tech Memo, Other Study Recommendations Summary)
- Appendix F: Evaluation Form for Future Projects
- Appendix G: FHWA Questionnaire
- Appendix H: FHWA Letter of Acceptance

Acronyms and Abbreviations

Acronym or Abbreviation	Definition
AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AM or a.m.	Ante Meridiem (before noon [morning])
APE	Area of Potential Effects
ARGS	Advanced Roadway Guidance Systems
AV	Autonomous Vehicle
BMP	Best Management Practice
BRT	Bus Rapid Transit
CCTV	Closed-Circuit Television
CE	Categorical Exclusion
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
CO	Carbon Monoxide
CV	Connected Vehicle
CWA	Clean Water Act
DMS	Dynamic Message Sign
DOT	Department of Transportation
e.g.	For example
EA	Environmental Assessment
EDC	Economic Development Center
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
EWG	East-West Gateway Council of Governments
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FY	Fiscal Year
GPS	Global Position System
HOT	High-Occupancy Toll
HOV	High-Occupancy Vehicle
HUD	United States Department of Housing and Urban Development
Hwy.	Highway
I-	Interstate
i.e.	That is
ITS	Intelligent Transportation Systems
LED	Light-Emitting Diode
LOS	Level of Service
LRT	Light Rail Transit
LRTP	Long Range Transportation Plan
LWCF	Land and Water Conservation Fund
Metro	Bi-State Development
MO	Missouri or Missouri Route

Acronym or Abbreviation	Definition
MoDOT	Missouri Department of Transportation
mph	miles per hour
MUTCD	Manual on Uniform Traffic Control Devices
MVDS	Microwave Vehicle Detection System
N/A	Not Applicable or Not Available
NEPA	National Environmental Policy Act
NGA	National Geospatial-Intelligence Agency
NHPA	National Historic Preservation Act
NO ₂	Nitrogen Dioxide
NRHP	National Register of Historic Places
NTCIP	National Transportation Communications for ITS Protocol
O ₂	Ozone
Pb	Lead
PCE	Programmatic Categorical Exclusion
PEL	Planning and Environmental Linkages
PM or p.m.	Post Meridiem (after noon)
PM ₁₀	Particulate matter 10 micrometers or less in diameter
PM _{2.5}	Particulate matter 2.5 micrometers or less in diameter
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
Route or Rte.	State Route
RWIS	Road Weather Information Stations
SAE	Society of Automotive Engineers
SAG	Senior Advisory Group
SH	State Highway
SHPO	State Historic Preservation Officer
SIU	Section of Independent Utility
SOV	Single-Occupancy Vehicle
SO ₂	Sulfur Dioxide
SSM	Sisters of Saint Mary
St.	Saint or Street
STIP	Statewide Transportation Improvement Program
TAG	Technical Advisory Group
TBD	To Be Determined
TCIG	Transportation Corridor Improvement Group
TDM	Travel Demand Model or Transportation Demand Management
TIP	Transportation Improvement Program
TSM	Transportation System Management
UMSL	University of Missouri St. Louis
UPS	United Parcel Service
U.S.	United States
US	United States Highway
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VMS	Variable Message Signs
VMT	Vehicle Miles Traveled

Executive Summary

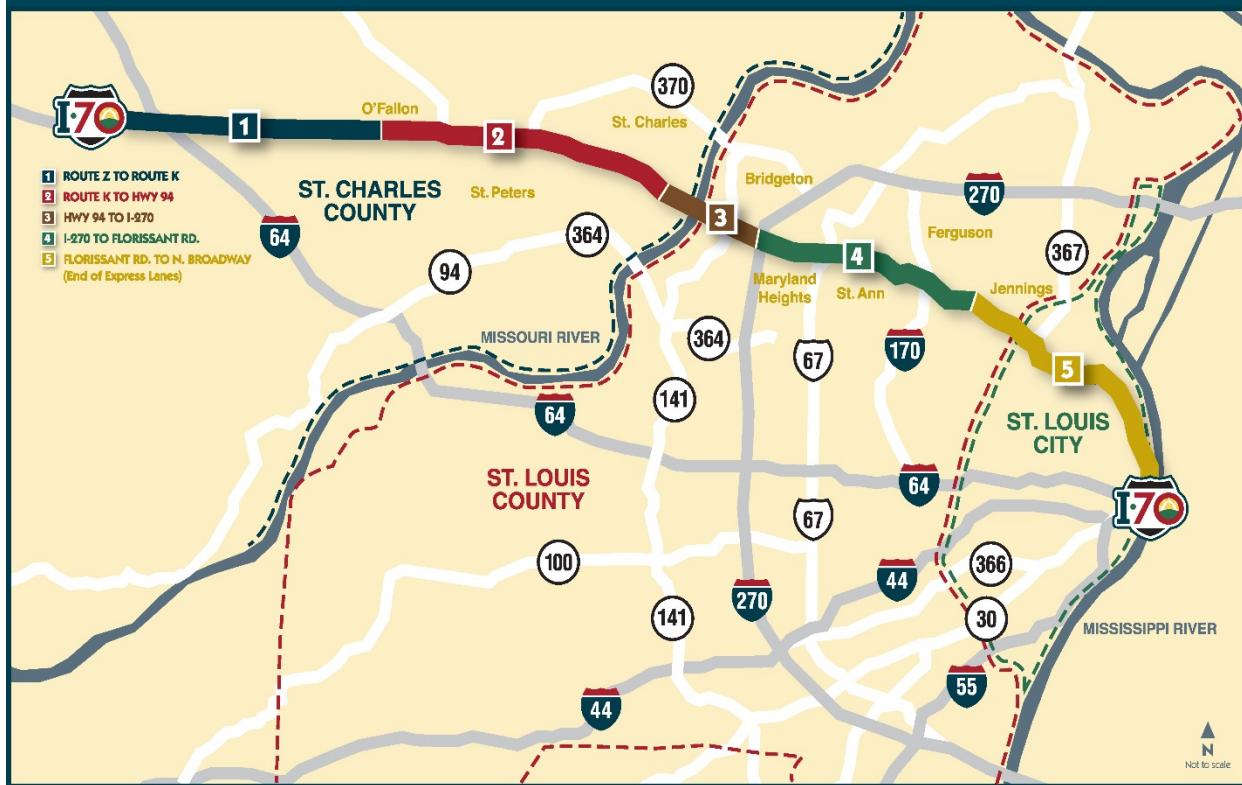
Introduction and Study Background

The Missouri Department of Transportation (MoDOT), in partnership with the East-West Gateway Council of Governments (EWG) and Bi-State Development (Metro), initiated this I-70 Planning and Environmental Linkages (PEL) Study (Study) to set a vision and strategic plan for the future of the Interstate 70 (I-70) corridor in the Saint (St.) Louis Region. The limits of the Study (Study Corridor) include an approximately 40-mile segment of I-70 from Wentzville (Route Z) to the end of the express lanes near North Broadway in the City of St. Louis, Missouri (see Figure 1). This report uses the term "Study Corridor" when referring to the segment of the I-70 facility within these limits. The Study Corridor was divided into the following segments based on similarities in surrounding land use and corridor function, such as areas where traffic patterns changed from suburban to a more urban nature.

- **Segment 1:** Wentzville (Route Z) to Route K (8.3 miles)
- **Segment 2:** Route K to Highway 94 (10.5 miles)
- **Segment 3:** Highway 94 to I-270 (4.4 miles)
- **Segment 4:** I-270 to Florissant Road (7.7 miles)
- **Segment 5:** Florissant Road to North Broadway (the end of the express lanes) (9.3 miles)

The particular area under study (Study Area) includes a 0.25-mile buffer on each side of the Study Corridor and extends up to one mile north and south of I-70 along major connecting routes. The Study Area includes portions of St. Charles County, St. Louis County, the City of St. Louis, and numerous municipalities within these areas. This report uses the term "Study Area" when referring to this area, which served as the boundary for data collection, analysis, and recommendations.

The Study team, which included MoDOT, EWG, Metro, and the consultant team, used the PEL approach to guide this study. Using this approach, the Study team developed a vision for the corridor and Purpose and Need statement; identified conceptual improvement strategies; and evaluated these strategies to develop corridor-wide recommendations and a prioritized list of segment-level recommendations. Input was solicited from agencies, stakeholders, key influencers, and members of the public during the Study process. This Study provides guidance for identifying projects in the Study Area to advance to the preliminary design phase and serves as the foundation for future National Environmental Policy Act (NEPA) studies that will be undertaken as specific projects are identified.

Figure 1: Study Corridor Segments


Study Vision and Purpose and Need

The Study team, which includes the Transportation Corridor Improvement Group (TCIG), developed the I-70 corridor Vision Statement based on stakeholder and public input, and goals from local, regional, and statewide plans. The TCIG is comprised of MoDOT, EWG, and Metro. Together, these agencies perform a central role in funding, building, and managing key components of the transportation network in the St. Louis area. The Vision Statement is identified below:

I-70 Corridor Vision Statement

The vision for the I-70 corridor between Wentzville and the Mississippi River is to provide a safe, well-maintained, interstate facility offering reliable mobility for all users into the distant future.

- ◆ By year 2045, the corridor will afford multi-modal transportation options, foster vibrant communities, lessen the highway's impact on neighborhoods that pre-date the interstate, and be a catalyst for economic development opportunities.
- ◆ The corridor will be made efficient through enhanced public transportation, and modernized and made smart to accommodate an array of new and emerging technologies, including connected vehicles (CV) and autonomous vehicles (AV).
- ◆ Communities along the corridor will thereby be effectively connected to the much larger intrastate and interstate roadway.
- ◆ At the regional level, commerce will be bolstered by efficient access to businesses, employment centers, and freight hubs, such as the St. Louis Lambert International Airport.

In conjunction with transportation improvements in the corridor, governments and private ventures will partner to coordinate investments that complement the I-70 transportation system and improve the economic vitality of the corridor.

The purpose of this Study is to investigate and identify the transportation problems in the Study Area and to recommend strategies and options for improvements that would:

- increase safety on the corridor for all users,
- manage existing and future traffic congestion,
- improve efficiency and reliability of freight movement,
- address substandard bridges and identified deficiencies in other physical assets; and
- improve multi-modal connections within and between communities and employment centers located on either side of the interstate.

I-70 Needs

I-70 needs included geometric deficiencies, operational conditions affecting capacity and safety for all modes, and various factors impacting efficiency of freight movement.

The *I-70 Planning and Environmental Linkages [PEL] Study Conditions Assessment Report* (Conditions Assessment Report) (MoDOT 2017a), provided in Appendix A, identified numerous transportation needs in the Study Area. These included pavement and geometric deficiencies, operational conditions affecting capacity and safety for all modes, and various factors impacting efficient movement of freight through the corridor. Pavement repairs are currently programmed for I-70 in the Study Corridor and are included in the No-Action Alternative (see Section 4.1). Therefore, pavement repairs are not identified as a project need in this Study. The transportation needs are summarized below:

- **Safety:** All sections of I-70 in the Study Corridor have higher vehicular crash rates than the statewide average. Clusters of pedestrian and bicycle crashes have also been identified in specific areas. Improvements are needed to address the causes of motorized and non-motorized crashes in the Study Area with the intent to reduce the vehicular crash rate to at or below statewide averages for similar facilities and improve safety for bicyclists and pedestrians.
- **System Performance:** Congestion in the Study Corridor impacts the ability of the corridor to effectively provide regional connectivity, and is projected to worsen through 2045. Infrastructure improvements and more efficient use of infrastructure are needed to improve or maintain an acceptable Level of Service (LOS) through 2045.
- **Freight Movement:** I-70 through the Study Corridor is a major freight route that experiences heavy commercial truck traffic. Infrastructure improvements, such as bringing bridge clearances to current standards and straightening sharp curves, and more efficient use of infrastructure are needed to alleviate freight bottlenecks and increase reliability of travel times in the Study Corridor.
- **Physical Conditions:** Portions of I-70 within the Study Corridor were among the first to be constructed as part of the nation's Interstate Highway System beginning in 1956. While MoDOT's maintenance program has extended the original design life of the infrastructure, many elements are in need of repair or replacement to maintain function and meet current design standards.
- **Multi-Modal Mobility and Connectivity:** Mode choice in the Study Area is limited by availability of public transportation and bicycle and pedestrian facilities, and varies widely along the corridor. Better access to public transportation and increased quality and connections of bicycle and pedestrian facilities are needed to improve transportation choices in the Study Area.

Study Goals

Study goals complement the Purpose and Need Statement and often help differentiate between alternatives. The goals identified for this Study are listed in Table 1. These goals were derived from the vision identified by the TCIG and stakeholders, and input from the public, key influencers, stakeholders, and advisory groups.

Table 1: Study Goals

Goal	Segment				
	1	2	3	4	5
Reduce potential for crashes, including crashes involving bicycles and pedestrians	✓	✓	✓	✓	✓
Maintain/preserve physical condition of infrastructure	✓	✓	✓	✓	✓
Improve LOS on mainline and at interchanges	✓	✓	✓	✓	✓
Improve efficiency of access to freight hubs to and from I-70	✓	✓	✓	✓	✓
Minimize/eliminate impediments to freight movement along I-70	✓	✓	✓	✓	✓
Allow improved accessibility to public transportation	✓	✓	✓	✓	✓
Improve active transportation to major destinations and the local network	✓	✓	✓	✓	✓
Minimize impacts to the natural environment	✓	✓	✓	✓	✓
Minimize impacts to the built environment	✓	✓	✓	✓	✓
Minimize construction issues, including disruption to utilities and the traveling public	✓	✓	✓	✓	✓
Reduce congestion on parallel road system	✓	✓			
Provide/improve interstate connections serving current/future development/redevelopment areas		✓	✓	✓	✓
Improve geometric configurations on I-70 to address high crash locations			✓	✓	
Improve access to Lambert Airport for passengers, employees, and freight/cargo				✓	
Optimize the function of the existing Express Lanes area					✓
Increase transportation options for households without access to vehicles					✓
Improve travel times between the City of St. Louis and suburban employment centers for households without access to vehicles					✓

Agency Coordination and Public Involvement

The Study team engaged agencies, stakeholders, key influencers, and the public during the Study process to get their feedback on issues and needs within the Study Area. Their input helped to formulate the vision and the Purpose and Need for the Study Corridor and identify issues to be considered in the conceptual strategies developed under this Study.

Agency Coordination

Resource agency scoping meetings were held on June 28, 2017 and July 26, 2018 with local, state, and federal agencies. The first meeting was intended to obtain agency input on the scope of issues to be addressed in this Study and the Purpose and Need. The second meeting was intended to present the conceptual strategies and prioritization process. Meetings also were held at

The Senior and Technical Advisory Groups provided input about overall needs of the Study Area and technical input on practical solutions for specific portions of the corridor.

key points in the Study with two advisory groups formed for the Study (Senior Advisory Group [SAG] and Technical Advisory Group [TAG]) to present information about the Study and obtain input at certain stages of the Study. The SAG included representatives from municipalities, local agencies, and businesses within the Study Area. Three TAGs were established for this Study, organized by the City of St. Louis, St. Charles County, and St. Louis County within the Study Area. Each TAG consisted of representatives from the city, counties, and the municipalities and stakeholders located therein. The TAGs provided technical knowledge and insights into practical solutions for their portion of the Study Corridor. TAG members included representatives from the City and respective counties and municipalities therein.

The TCIG solicited input from over 90 members of the community identified as key influencers in the Study Area. Key influencers included major employers in the Study Area and representatives of nonprofit organizations such as the Hispanic and Asian-American chambers of commerce. Key influencers who elected to engage with the Study team provided valuable input on Study Area issues that was considered in the evaluation of conceptual strategies.

Public Involvement



July 18, 2018 Public Meeting

Throughout this Study, several methods were used to engage the public and provide Study information, announce public meetings, and solicit feedback. These methods included a project website (www.envision70.com), an on-line MetroQuest survey, news and social media, and fliers. The Study team held four public official briefings and three public meetings over the duration of the Study to present information about and obtain input on issues and concerns about the Study Area.

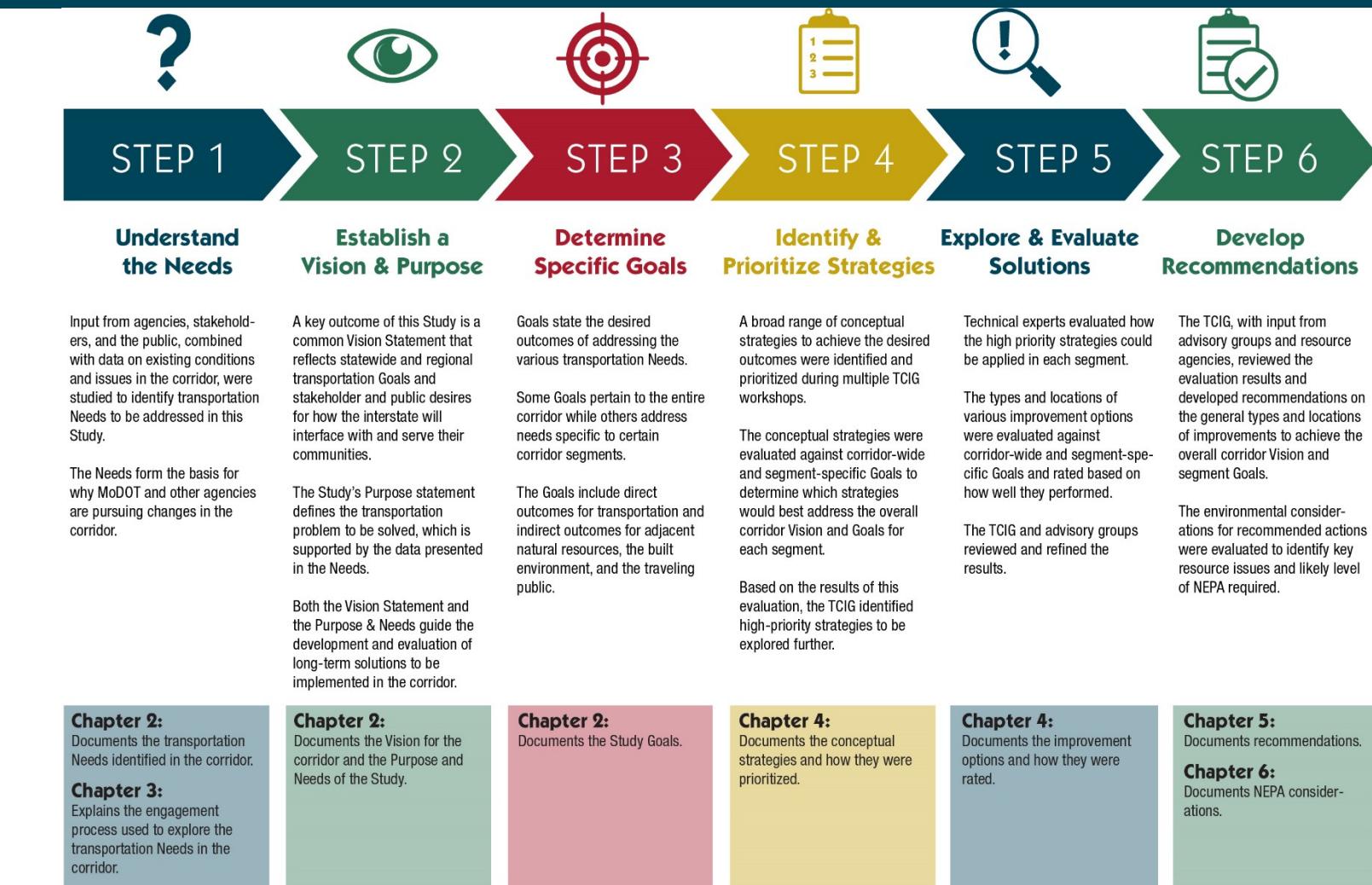
General themes that emerged from comments received included improving infrastructure design, addressing safety issues, relieving congestion, accommodating freight movement, improving and expanding transit service, improving bicyclist/pedestrian facilities and connectivity, improve wayfinding/signage, minimizing environmental impacts, and serving community development by considering underserved communities and improving access to services.

Strategy Identification, Development, and Evaluation

The Study team used a six-step process to establish the vision and Purpose and Need for this Study and to identify, develop, and prioritize improvement strategies to address them. The six steps are listed and described on Figure 2.



Project website

Figure 2: Key Steps in Process to Develop Recommendations


Conceptual Strategy Screening Process and Results

Conceptual Strategies

Conceptual strategies were developed and evaluated based on their ability to address the corridor vision, Study Purpose and Need, and specific goals established for the Study Area. Conceptual strategies are listed below:

- **Corridor Management/Technology Concept:** Expand or implement technologies to maximize the efficiency of the interstate system, such as Transportation System Management (TSM), Transportation Demand Management (TDM), Intelligent Transportation Systems (ITS); and infrastructure needs for newer technologies such as connected vehicles (CV) and autonomous vehicles (AV).
- **System Optimization Concept:** Improve safety and operations through localized improvements such as reducing or eliminating interchange conflict points, improving interchange operations, addressing weave sections, traffic calming measures on collector/distributor roads, or bringing interstate elements up to standards.
- **Mainline Capacity Concept:** Alleviate congestion by adding general purpose lanes or managed lanes such as express lanes, high-occupancy vehicle (HOV) lanes, or high-occupancy toll (HOT) lanes.
- **Freight Concept:** Address freight bottlenecks and improve efficiency of access to freight hubs by upgrading infrastructure to better accommodate freight, implementing MoDOT and Freightway priority projects, raising substandard bridge heights, or reconfiguring interchanges or access routes to freight hubs.
- **Transit Concept:** Expand and enhance transit infrastructure and service to increase transit access and mode choice with higher cost improvements such as commuter or light rail; moderate cost improvements such as bus rapid transit (BRT), bus only lanes, or larger capacity buses/trains; and lower cost improvements such as adding express routes, increasing service frequency, or implementing bus priority.
- **Alternate/Parallel Route Concept:** Alleviate congestion on I-70 by improving local/parallel routes to increase their viability as an alternate route to I-70, including safety and capacity improvements, improving connectivity to the interstate, and improving continuity of parallel routes
- **Bicycle and Pedestrian Concept:** Expand and enhance bike/ped infrastructure to encourage active transportation and increase mode

choice by adding or improving bike/ped facilities crossing I-70 and improving connections to the larger bike/ped network.

Evaluation and Prioritization of Conceptual Strategies

Individual elements of each conceptual strategy were evaluated and rated based on how well they would address the goals of each segment, as identified in Table 1. Goals fell into two categories – transportation goals and impact minimization goals. Transportation goals, which varied somewhat by segment depending on the specific issues identified in each segment, were used to gauge the benefits of each strategy. Impact minimization goals were used to gauge the disadvantages of each strategy.

- **Transportation Goals:** Strategies were rated good, fair, or poor for each goal based on how well they would achieve transportation goals, which was an indication of how much benefit would be gained from their implementation in terms of addressing the needs and vision for the corridor.
- **Impact Minimization Goals:** Strategies were rated good, fair, or poor for each goal based on the degree of impact likely associated with a strategy in a given segment. Strategies rated good or fair were more desirable than strategies rated poor, but poorly rated strategies (that is [i.e.], strategies that would likely have high impacts) could still be worthy of consideration if they would effectively address transportation needs.

Based on their performance in addressing the collective goals of each segment, the conceptual strategies were prioritized into the three categories listed below. Because only strategies that met the Purpose and Need at a basic level were considered in this PEL Study, no strategies were eliminated or screened out; all were considered potentially feasible solutions.

- **High Priority Strategies:** Strategies that would do the best job overall of addressing the goals in each segment. These strategies were explored further in this PEL Study to identify and evaluate improvement options in each segment.
- **Other Recommended Strategies:** Strategies that would do a reasonably good job of addressing the goals in each segment, but would either offer less benefit than the high-priority strategies or would have considerably higher potential for impacts. While they were not discussed in the Study Recommendations or Anticipated NEPA Process and Considerations chapters of this Study, they are documented in the report and recommended for further consideration.

- **Long-Term Strategies for Future Consideration:** Strategies that would address some of the goals in each segment and may be beneficial for future consideration, but were not explored further in this PEL Study.

High priority strategies were rated as such because they were determined to do the best job of addressing the most goals and were not anticipated to have substantial impacts on adjacent communities, the natural environment, or the traveling public. Table 2 lists the high priority strategies and indicates those segments in which they apply.

Table 2: High-Priority Strategies

High-Priority Strategy	Segment				
	1	2	3	4	5
Bring facility to current standards				✓	✓
Upgrade infrastructure to better accommodate freight	✓	✓	✓	✓	✓
Improve local/parallel road system	✓	✓	✓		✓
Reduce/eliminate conflict points at interchanges	✓	✓	✓	✓	✓
Improve interchange operations	✓	✓			
Improve operations of interchanges/ provide full access interchanges					✓
Consolidate and improve access points					✓
Consolidate and improve access points at airport and throughout segment				✓	
Add/improve bicycle and pedestrian facilities	✓	✓	✓	✓	✓

Study Recommendations

The Study team reviewed the high priority strategies and, in collaboration with the TAG and the SAG, developed recommendations to achieve the long-term vision for the I-70 corridor. Study recommendations were grouped into three categories: corridor-wide, segment-level, and evaluation criteria for future projects, as summarized below.

Corridor-wide Recommendations

These recommendations focus on implementing the Corridor Management/Technology Concept throughout the Study Area. The main components of this concept are TDM, ITS, CV, and AV. These concepts were explored at the corridor level because they were not location-specific and warranted a corridor-wide approach. The corridor-wide recommendations are summarized below (refer to Section 5.1 and Appendix E for more details).

- **Transportation Demand Management (TDM):** TDM strategies improve transportation system efficiency, extend the useful life of a

transportation facility, reduce fuel consumption, and improve air quality through low-cost, high-efficiency transportation solutions. Existing and recommended TDM strategies are listed in Table 3 (TDM strategies are defined in Section 5.1.1 and Table 5-1):

Table 3: Existing and Recommended TDM Measures

Existing TDM Measures in Study Area	Additional Recommended TDM Measures for Study Area (by Segment)
<ul style="list-style-type: none"> ▪ RideFinders carpooling and vanpooling services ▪ Commuter parking lots ▪ Project real-time and traveler information ▪ Bike-share program ▪ St. Louis County road diet policy ▪ EWG congestion management process and policies ▪ Reduced transit fares program ▪ Safe Trek 	<ul style="list-style-type: none"> ▪ Parking restrictions (Segment 5) ▪ Trip reduction ordinances (Segments 4 and 5) ▪ HOV lane (all segments) ▪ HOT lane (if mainline capacity improvements are proposed; all segments) ▪ Predictive traveler information (all segments) ▪ Dynamic ridesharing (Segments 3-5) ▪ Large employer and campus TDM (Segments 1-3) ▪ Flexible work arrangements (all segments) ▪ Tolling and dynamic tolling (Segments 3-5) ▪ Zone pricing (Segment 5) ▪ Dynamically priced parking (Segment 5)

- **Intelligent Transportation Systems (ITS):** ITS improves traffic operations and roadway effectiveness by providing real-time road and traffic information to motorists using communications such as variable message signs. MoDOT currently uses ITS applications along I-70 and computer-controlled signal timing changes at select traffic signals in the Study Area in response to real-time traffic conditions. The following additional ITS applications are recommended:
 - Add closed-circuit televisions (CCTVs) to fill gaps in coverage and add dynamic message signs (DMS) to provide greater traveler information.
 - Strategically integrate ITS systems in conjunction with infrastructure improvements.
 - Invest in ongoing expansion of data transmission capabilities.
 - Upgrade ITS equipment to National Transportation Communications for ITS Protocol (NTCIP) standards.
 - Adopt FHWA ITS standards for CV interfaces.
- **Connected Vehicle (CV) and Autonomous Vehicle (AV) Technologies:** CV technology involves vehicles with imbedded

transceivers that can detect and communicate with other CVs and communicate local travel information with a transportation agency, allowing the agency to share broader travel information from the region. A CV program can create a nationwide driving environment with safety and mobility information exchanged in almost real-time, which can significantly reduce the number of avoidable crashes and provide more efficient route selection. AV technology involves a vehicle that shifts some or all of the driving responsibilities from the human driver to a computer. Some autonomous features exist in today's vehicles, such as lane departure assistance and adaptive cruise control.

MoDOT and EWG have begun to identify relevant CV and AV technology initiatives, and several area studies have been prepared that outline future deployment of CV and AV technologies in the St. Louis region. Recommendations to prepare for and incrementally implement CV and AV technologies are listed in Table 4.

Table 4: Recommendations for Implementing CV and AV Technologies

Implementation Timeframe	CV and AV Recommendations
Near-Term (0 to 4 years)	<ul style="list-style-type: none"> Invest in CV deployment prerequisites: <ul style="list-style-type: none"> Update traffic management software to enable processing of CV data. Identify and plan for CV roadside unit mounting locations and backhaul communication links along I-70. Consider using the existing Express Lanes in the City of St. Louis to test AV/CV.
Mid-Term (5 to 14 years)	<ul style="list-style-type: none"> Update signing, striping, and traffic control device standards. Invest in CV-enabled roadside units in strategic areas.
Long-Term (15 to 25 years)	<ul style="list-style-type: none"> Implement AV-only lanes.
Future-Term (25 years and beyond)	<ul style="list-style-type: none"> Implement advanced roadway guidance systems (ARGS), which communicate detailed mapping of roadway geometry, lane designations, wayfinding, and roadway conditions in real-time to AVs and CVs.

Segment-level Recommendations

Recommendations at the segment level consisted of general types and locations of transportation improvements to illustrate how the high-priority strategies could be applied in each segment. Instead of providing a comprehensive inventory of projects or an implementation plan, the intent was to provide a sampling of options that would address the goals in each segment and incrementally move the corridor toward the long-term vision established under this Study. Segment-level recommendations included

improving interchanges, bridges, and/or intersections; adding auxiliary lanes; widening shoulders; improving routes parallel to I-70; and/or straightening curves as applicable to each segment of I-70 in the Study Area.

Evaluation Criteria for Future Projects

Achieving the vision for the Study Corridor relies not only on developing and advancing future projects based on the recommendations of this Study, but making sure that all future projects consider and incorporate measures to support mode options, new technologies, and commerce; and provide connections that positively affect surrounding neighborhoods. To that end, the following questions will be used as an evaluation tool to assess how well future projects align with the long-term vision established for the I-70 corridor in this Study. This tool will apply to roadway improvement projects on routes that are owned or maintained by MoDOT, regardless of the project sponsor.

Evaluation Criteria for Future Project Proposals

- ◆ Does the proposed action address one of the recommended strategies for the segment? If so, which category: high-priority strategy, other recommended strategy, or long-term strategy.
- ◆ How does the proposed action allow for existing and planned transit infrastructure and operations in the project area?
- ◆ How does the proposed action encourage active transportation and facilitate planned bicycle and pedestrian facilities in the project area?
- ◆ How does the proposed action incorporate design measures and ITS elements to meet the needs of CVs and AVs as outlined in this Study?
- ◆ For actions involving capacity expansion on mainline I-70, how does the proposed action address recommended TDM measures as outlined in this Study?
- ◆ For actions involving interstate interchanges, accesses, or improvements to connecting or parallel routes, how does the proposed action provide efficient access to existing and planned businesses, employment centers, and freight hubs in the project vicinity?
- ◆ For actions in or adjacent to neighborhoods that pre-date the interstate, how does the proposed action lessen the highway's impact on adjacent neighborhoods?
- ◆ For actions in the vicinity of Lambert Airport, how does the proposed action improve access to the airport for passengers, employees, and freight/cargo?

A scoring system will be used to assess how consistent future projects are with the long-term vision established for the Study Corridor. The scoring system assigns a weight to each criterion based on relative importance. The

evaluation form that will be used to assess future projects is provided in Appendix F. Before a project in the Study Area is added to the Transportation Improvement Program/State Transportation Improvement Program (TIP/STIP), MoDOT and/or EWG will review and consider the project evaluation results as part of the decision-making process to prioritize transportation needs each fiscal year.

Anticipated National Environmental Policy Act (NEPA) Process and Considerations

As MoDOT identifies projects to advance to development, it will coordinate with FHWA to determine environmental clearance requirements under NEPA. This Study evaluated environmental resources at a planning level based on existing mapping and data resources, focusing on key resources with the highest potential to influence decision-making for recommended transportation improvements. These resources included land use, right-of-way, socioeconomics and Environmental Justice, sinkholes, water resources and floodplains, wetlands and waters of the United States (U.S.), hazardous materials sites, parks and recreation resources (including Section 4[f] and Section 6[f] properties), and air quality. Resources with additional regulatory requirements also were considered, such as the Endangered Species Act (ESA), the Clean Water Act (CWA), and the National Historic Preservation Act (NHPA) (Section 106), as well as resources that typically are of concern for the general public, such as traffic noise.

Based on a review of sensitive resources present and potential improvements associated with high-priority strategies, key resource issues are identified below by segment. Future NEPA studies will require more detailed analyses for environmental resources that could be impacted by the projects as they are implemented.

- **Segment 1:** Water resource and floodplain impacts are likely to occur, including 303(d)-listed impaired waterbodies. Sensitive resources adjacent to the right-of-way that could be impacted include recreation resources, cemetaries, hazardous materials, and wetlands and other waters of the U.S. Other likely resource studies may include potential for impact to threatened and endangered species, potential traffic noise impacts, and tranportation conformity for air quality. Indirect effects to businesses may also be an issue depending on the nature of parallel route improvements.
- **Segment 2:** Water resource and floodplain impacts are likely to occur, including 303(d)-listed impaired waterbodies. Sensitive resources adjacent to the right-of-way that could be impacted include recreation resources, cemetaries, sinkholes, and hazardous materials. Other likely resource studies may include potential for impact to threatened and endangered species, potential traffic noise impacts,

and transportation conformity for air quality. Indirect effects to businesses may also be an issue depending on the nature of parallel route improvements.

- **Segment 3:** Water resource and floodplain impacts are likely to occur, including 303(d)-listed impaired waterbodies. Sensitive resources adjacent to the right-of-way that could be impacted include recreation resources and wetlands and other waters of the U.S. Other likely resource studies may include potential for impact to threatened and endangered species, potential traffic noise impacts, and transportation conformity for air quality. Indirect effects to businesses may also be an issue depending on the nature of parallel route improvements.
- **Segment 4:** Water resource and floodplain impacts are likely to occur. Other sensitive resources adjacent to the right-of-way that could be impacted include recreation resources, cemetaries, hazardous materials, and wetlands and other waters of the U.S. Improvements with right-of-way impacts have a high likelihood of affecting environmental justice populations. Other likely resource studies may include potential traffic noise impacts and transportation conformity for air quality.
- **Segment 5:** Due to existing right-of-way constraints, implementation of some high-priority strategies could result in land use impacts or affect adjacent environmental justice populations. Other sensitive resources adjacent to the right-of-way that could be impacted include recreation resources, cemetaries, sinkholes, and hazardous materials. Other likely resource studies may include potential traffic noise impacts and transportation conformity for air quality.

NEPA Classes of Action

FHWA regulations (23 Code of Federal Regulations [CFR] 771.115) define three classes of action that prescribe the level of documentation required in the NEPA process, as summarized below:

The three classes of NEPA action are:

Class I –
Environmental Impact Statement

Class II –
Categorical Exclusion

Class III –
Environmental Assessment

- **Class I (Environmental Impact Statement [EIS]):** Actions that significantly affect the environment require an EIS (40 CFR 1508.27).
- **Class II (Categorical Exclusion [CE]):** Actions that do not individually or cumulatively have a significant environmental effect are excluded from the requirement to prepare an EA or EIS. A list of CEs normally not requiring NEPA documentation is provided in 23 CFR 771.117(c). FHWA and MoDOT executed a programmatic agreement on June 19, 2018, that allows MoDOT environmental staff to approve projects on this list as CEs without FHWA concurrence. These are referred to as Programmatic Categorical Exclusions (PCEs). Per 23 CFR 771.117(b), any action that normally would be classified as

a CE but could involve unusual circumstances will require FHWA, in cooperation with the applicant (MoDOT), to conduct appropriate environmental studies to determine if the CE classification is proper. MoDOT prepares a PCE or CE II form for actions qualifying for a CE, but requiring FHWA approval.

- **Class III (Environmental Assessment [EA]):** Actions in which the significance of the environmental impacts is not clearly established require preparation of an EA to determine the appropriate environmental document required. All actions that are not Class I or II are Class III. An EA.

As MoDOT identifies strategies to implement, it will coordinate with FHWA to determine environmental clearance requirements under NEPA. Likely NEPA classes of action for transportation improvement projects initiated to implement the high-priority strategies recommended in this Study are summarized in Table 5:

Table 5: Likely NEPA Classes of Action for High-Priority Improvements

High Priority Strategy	Location (Segment)	Likely NEPA Class of Action
Parallel route improvements	Segments 1, 2, and 3	PCE, CE II, or EA
Auxiliary lanes	Segments 1, 2, and 5	PCE or CE II
Full interchange reconfiguration	All segments	CE II or EA
Partial interchange reconfiguration	Segments 3, 4, and 5	PCE or CE II
Minor interchange improvements	All segments	PCE
Intersection reconfiguration	Segment 1	PCE or CE II
Minor intersection improvements	Segment 1	PCE
New access to I-70	Segment 1	CE II
Access consolidation	Segments 4 and 5	CE II
Bridge replacement	Segments 4 and 5	PCE, CE II, or EA
Curve straightening	Segments 4 and 5	PCE or CE II
Shoulder widening	Segment 5	PCE or CE II
Add/improve bicycle/pedestrian facilities	All segments	PCE

When projects move into the NEPA phase, MoDOT will consult with FHWA on the appropriate class of action, and FHWA will make the final determination. Projects in the Study Area for which a NEPA decision document has been issued may require a reevaluation or new NEPA study depending on the nature of changes to the preferred alternative, changes in existing conditions, and the length of time since the decision was issued.

FHWA developed a standard questionnaire to guide PEL studies and help facilitate the transition to the NEPA phase for future projects. That questionnaire, provided in Appendix G, summarizes the information analyzed in this Study and issues that a future project team should be aware of to efficiently move future projects into the NEPA phase.

Independent Utility and Logical Termini

MoDOT must demonstrate that each improvement project has independent utility and logical termini. Independent utility means that the improvement project can be completed and function properly independent of other improvements—it does not rely on other projects to solve a problem. When a singular project has independent utility, it can be considered by itself in a CE, EA, or EIS. Logical termini relate to independent utility and is defined as the rational end points for a transportation improvement (the project limits) and for assessing environmental impacts. The intent of establishing logical termini is to ensure that proposed transportation improvements satisfy an identified need, avoid unexpected side effects, and that environmental considerations can be sufficiently evaluated.

1.0 Introduction

The Missouri Department of Transportation (MoDOT), in partnership with the East-West Gateway Council of Governments (EWG) and Bi-State Development (Metro), initiated the Envision I-70 study (Study) to set a vision and a strategic plan for the future of the Interstate 70 (I-70) corridor in the Saint (St.) Louis Region. This long-term vision helps guide transportation priorities. Specifically, this Study:

- Identifies environmental constraints and assesses the current state of the corridor, including the land use and development patterns that have impacted its current operation and condition
- Identifies transportation needs, regional and community goals regarding I-70, and establishes a long-term vision for the corridor
- Identifies and evaluates improvement strategies to address transportation needs and meet I-70 goals at regional and community levels
- Documents recommendations and a decision-making framework to achieve the vision for the I-70 corridor

This Study serves as a guidance document providing criteria to evaluate the consistency of future project proposals with the overall vision for the corridor.

The Study is being conducted using a Planning and Environmental Linkages (PEL) approach. PELs represent a collaborative and integrated approach that use the information, analysis, and products developed during planning to inform the environmental review process. The Federal Highway Administration (FHWA) promotes the use of PELs, largely to integrate environmental issues and public involvement with project planning and shorten the time required to take projects from planning to implementation. There are a number of ways this Study can be used to streamline future projects in the Study Area as they are advanced into the National Environmental Policy Act (NEPA) phase. These include developing agency coordination and public involvement programs, developing a purpose and need statement, identifying environmental issues, establishing evaluation criteria, and developing and screening alternatives to achieve the vision established for the Study Corridor for projects as they are advanced into the NEPA phase. While this Study may not be the only source of project proposals for the I-70 Study Area, this report will serve as a guidance document that provides the criteria against which future project proposals will be evaluated for consistency with the overall vision for the corridor established in this Study. FHWA has reviewed this PEL Study, and their letter of acceptance for this Study is provided in Appendix H.

The Study Corridor encompasses an approximately 40-mile long segment of I-70 from Wentzville to the City of St. Louis.

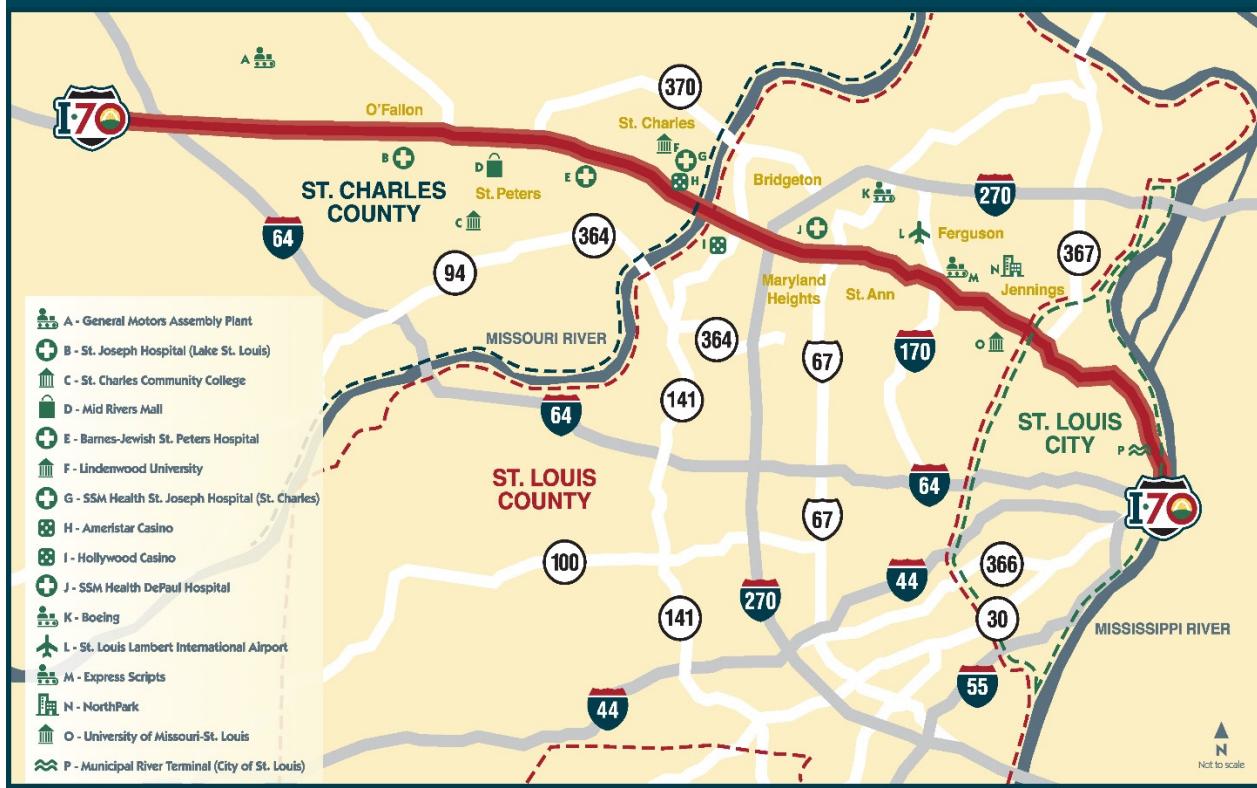
1.1 Study Area Location and Description

President Eisenhower signed the Federal Aid-Highway Act on June 29, 1956. The law directed all states to build a system of interstate highways to connect major cities across the United States (U.S.), with construction to be completed by 1972. Construction of the first two segments of I-70 began in 1956 shortly after the Act was signed, with the first segment built in the City of St. Charles, Missouri, and the second segment built in the City of St. Louis, Missouri. This allowed St. Charles to claim the title of “home of the first interstate highway in America” (MoDOT 2018a).

I-70 is one of the primary east-west routes across the U.S. It plays a key role in the economic health of the State of Missouri and the St. Louis region. The limits of the Study (Study Corridor) include an approximately 40-mile segment of I-70 from Wentzville (Route Z) to the end of the express lanes near North Broadway in the City of St. Louis, Missouri (see Figure 1-1). This report uses the term “Study Corridor” when referring to the segment of the I-70 facility within these limits.

The particular area under study (Study Area) includes a 0.25-mile buffer on each side of the Study Corridor. At major interchanges, the Study Area extends up to one mile north and south of I-70 along connecting routes. The Study Area includes portions of St. Charles County, St. Louis County, the City of St. Louis, and numerous municipalities within these areas. This report uses the term “Study Area” when referring to this area, which served as the boundary for data collection, analysis, and recommendations.

Within the Study Corridor, the highway varies in width from two to six lanes in each direction, with two additional lanes designated as express lanes in the City of St. Louis. The I-70 corridor serves major employment centers such as downtown St. Louis, residential communities (urban, suburban, and rural), St. Louis Lambert International Airport (Lambert Airport), and regional destinations, as shown in Figure 1-1.

Figure 1-1: Study Corridor


1.2 Study Corridor Segments

Given the length of the I-70 Study Corridor, and to more finely define problems and needs, the Study Corridor was divided into five segments. These segments were identified based on similarities in surrounding land use and corridor function. Corridor function was defined as variations along I-70 where traffic patterns changed from suburban to a more urban nature, as well as locations where traffic densities changed, such as in proximity to system-to-system connections. The five segments are listed below and shown on Figure 1-2:

- Segment 1: Wentzville (Route Z) to Route K
- Segment 2: Route K to Highway 94
- Segment 3: Highway 94 to I-270
- Segment 4: I-270 to Florissant Road
- Segment 5: Florissant Road to North Broadway (the end of the express lanes)

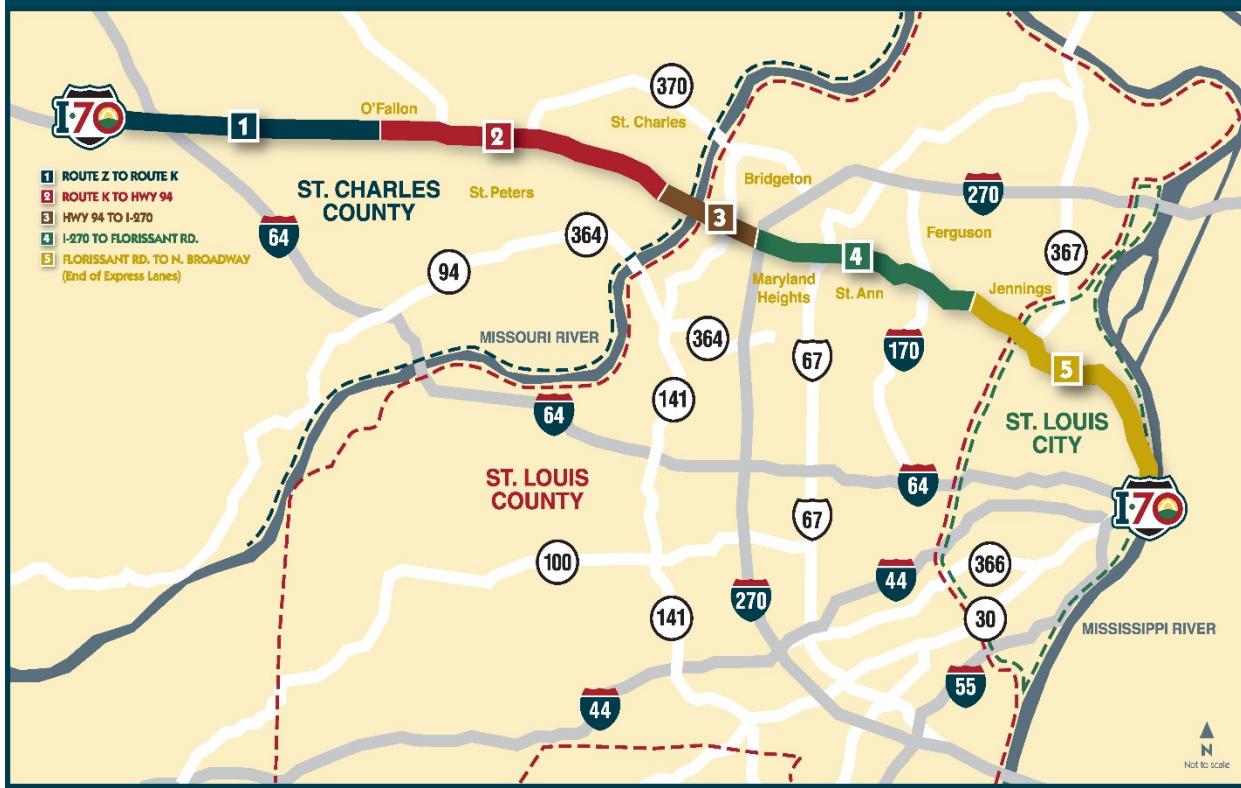
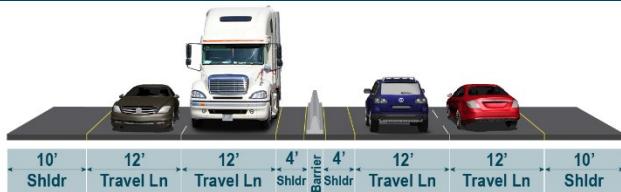
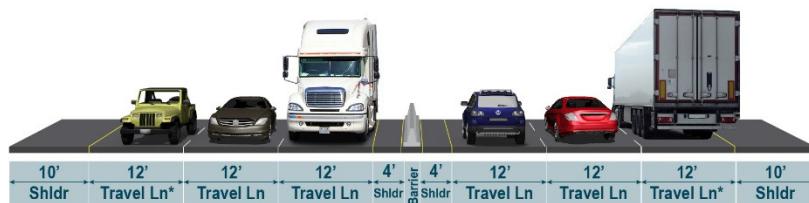
Figure 1-2: Study Corridor Segments


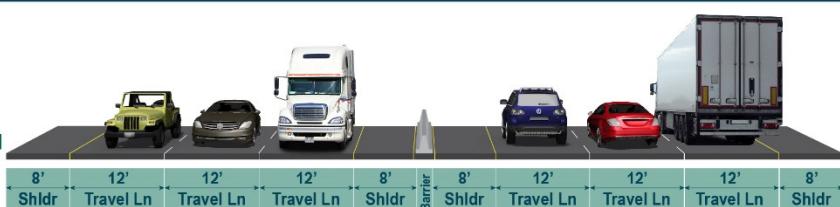
Table 1-1 describes each segment, including length and location, primary land uses, major destinations and traffic generators, main connecting routes, and existing transportation infrastructure. Figure 1-3 illustrates the typical cross-sections for each segment. Environmental resources within each segment are discussed in Chapter 6.0.

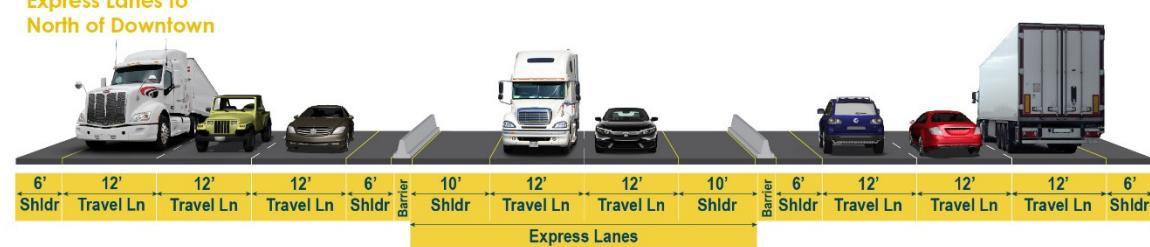
Table 1-1: Study Area Description by Segment

Characteristic	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5
Segment length and location	<ul style="list-style-type: none"> 8.3-miles of I-70, from Rte. Z (Church St.) to Route (Rte.) K (Main St.) in St. Charles County. Traverses municipalities of Wentzville, Lake St. Louis, and O'Fallon. 	<ul style="list-style-type: none"> 10.5-miles of I-70, from Rte. K (Main St.) to Highway (Hwy.) 94 (1st Capitol Dr.) in St. Charles County. Traverses municipalities of O'Fallon, St. Peters, and St. Charles. 	<ul style="list-style-type: none"> 4.4-miles of I-70, from Hwy. 94 (1st Capitol Dr.) to I-270; falls within St. Charles County (west of Missouri River) and St. Louis County (east of Missouri River). Traverses municipalities of St. Charles, Earth City, and Maryland Heights. 	<ul style="list-style-type: none"> 7.7-miles of I-70, from I-270 to Florissant Rd. (Route N) Within St. Louis County; traverses municipalities of Bridgeton, St. Ann, Edmundson, Woodson Terrace, Kinloch, Cool Valley, and Normandy. 	<ul style="list-style-type: none"> 9.3-miles of I-70, from Florissant Rd. and N. Broadway. Within St. Louis County; traverses municipalities of Normandy, Northwoods, Pine Lawn, Jennings, and St. Louis proper.
Primary land uses	<ul style="list-style-type: none"> Mostly low-density single-family residential with areas of big box/highway commercial, light industrial, and industrial, with pockets of agricultural and undeveloped land. 	<ul style="list-style-type: none"> Low to medium density mix of single and multi-family residential, big box/highway commercial, regional retail, and light industrial, with pockets of agricultural and undeveloped land. 	<ul style="list-style-type: none"> Medium density single-family and multi-family residential west of the Missouri River with commercial near South 5th St. Commercial and industrial east of the Missouri River. 	<ul style="list-style-type: none"> Lambert Airport and associated commercial and light industrial are the primary land uses. A mix of single-family and multi-family residential with pockets of commercial exist primarily south of I-70. 	<ul style="list-style-type: none"> Medium to high density single-family and multi-family residential with large areas of industrial, light industrial, and commercial; central business district
Major destinations and traffic generators	<ul style="list-style-type: none"> General Motors Wentzville Assembly Center, Element Church of Wentzville, Founders Park, Lake St. Louis, Lake St. Louise, and St. Joseph Hospital. 	<ul style="list-style-type: none"> Several large high schools and recreation complexes, Mid Rivers Mall, new large strip mall across from MRM, and Lindenwood University. 	<ul style="list-style-type: none"> West Lake and Champ Landfill, United Parcel Service (UPS) Earth City Hub, Ameristar Casino, Streets of St. Charles development, St. Charles Convention Center, historic downtown St. Charles, and Hollywood Casino and Amphitheatre. 	<ul style="list-style-type: none"> Lambert Airport, Sisters of St. Mary (SSM) Health DePaul Hospital-St. Louis, Boeing, University of Missouri St. Louis (UMSL), NorthPark and ExpressScripts. 	<ul style="list-style-type: none"> UMSL, Norwood Country Club, Near North Riverfront, O' Fallon Park, and downtown St. Louis/central business district.
Main parallel and connecting routes	<ul style="list-style-type: none"> Average interchange spacing is 1.7 miles. Five connecting routes: Rte. Z/Church St., I-64/United States Highway (US) 61, Rte. A/Freymuth Rd., Lake St. Louis Blvd./Guthrie Rd., and Bryan Rd. Parallel routes are fairly continuous: Veterans Memorial Pkwy. along the south of I-70 and E. Pitman Ave. and W. Terra Ln. along north side of I-70. 	<ul style="list-style-type: none"> Average interchange spacing is 1.5 miles. Seven connecting routes: Rte. K/Main St., TR Hughes Blvd., Hwy. 79/Salt Lick Rd., Mid Rivers Mall Dr., Hwy. 370, Cave Springs Rd./Truman Blvd./Muegge Rd., Zumbehl Rd. Parallel routes are fairly continuous: Veterans Memorial Pkwy. along the south of I-70 and I-70 N. Outer Rd., E. Terra Ln, W. Terra Ln, and Clay St. along the north side. 	<ul style="list-style-type: none"> Average interchange spacing is 1.1 miles. Four connecting routes: Hwy. 94/1st Capitol Dr., Fairgrounds Rd., 5th St., Rte. 141/Earth City Expressway. Parallel routes west of Missouri River: Veterans Memorial Pkwy. along the south of I-70 and Boone's Lick Rd. along the north side. 	<ul style="list-style-type: none"> Average interchange spacing is 1.0 miles. Eight connecting routes: I-270, Hwy. 180 (St. Charles Rock Rd.), US 67 (Lindbergh Blvd.), Cypress Rd., Air Flight Dr. at Lambert Airport, Rte. 115 (Natural Bridge Rd.), I-170, N. Hanley Rd. No consistent parallel routes 	<ul style="list-style-type: none"> Average interchange spacing is 0.5 miles. 18 connecting routes: Rte. N/Florissant Rd., Bermuda Dr., Lucas and Hunt Rd./Rte. U, Jennings Station Rd., Goodfellow Blvd., Hwy. 367/Riverview Blvd./ Bircher Blvd., Union Blvd., Kingshighway, Shreve Ave., W. Florissant Ave., East Carrie Ave., Adelaide Ave., E. Grand, Salisbury St./ McKinley Bridge, Branch St., St. Louis Ave., I-44/Stan Musial Veterans Memorial Bridge, Cass/Broadway. Parallel routes are limited to Bircher Blvd. and N. Broadway along portions of the north side of I-70
Existing transportation infrastructure	<ul style="list-style-type: none"> Two travel lanes each direction west of I-64 and three travel lanes each direction east of I-64. 10-foot outside shoulders, 4-foot inside shoulders, barrier-separated median. Posted speed limit: 60 to 65 miles per hour (mph); 40 mph minimum speed. 	<ul style="list-style-type: none"> Three travel lanes each direction. 10-foot outside shoulders, 4-foot inside shoulders, barrier-separated median. Posted speed limit: 60 mph; 40 mph minimum speed. 	<ul style="list-style-type: none"> Four to Five travel lanes each direction. 10-foot outside shoulders, 4-foot inside shoulders, barrier-separated median. Posted speed limit: 60 mph; 40 mph minimum speed. Crosses Missouri River via Blanchette Bridge. 	<ul style="list-style-type: none"> Three travel lanes in each direction. 8-foot inside and outside shoulders, barrier-separated median. Posted speed limit: 60 mph; 40 mph minimum speed. MetroLink rail line along north side of I-70 from Air Flight Dr.; crosses I-170 south toward UMSL 	<ul style="list-style-type: none"> From Florissant Rd. to Union Blvd.: <ul style="list-style-type: none"> Three travel lanes in both directions from Florissant Rd. to Union Blvd. 10-foot outside shoulders, no inside shoulder, and barrier-separated median. Posted speed limit: 55 mph; 40 mph minimum speed. From Union Blvd. to N. Broadway (project terminus): <ul style="list-style-type: none"> Three general purpose lanes in both directions. 6-foot inside and outside shoulders. Two eastbound express travel lanes (Mark Twain Expressway) separated from general purpose lanes by median barriers. Express lanes have 10-foot inside and outside shoulders. Posted speed limit: 55 mph; 40 mph minimum speed.

Figure 1-3: Typical Cross-Sections in Each Study Corridor Segment
Segment 1
Rte. Z to I-70/I-64/US 61 Interchange

I-70/I-64/US 61 Interchange to Route K

Segment 2
Route K to Highway 94

Segment 3
Highway 94 to I-270

Segment 4
I-270 to Florissant Road

Segment 5
Florissant Road to Express Lanes

Express Lanes to North of Downtown


1.3 Planning Context

As noted above, the Study Corridor traverses two counties, the City of St. Louis, and numerous municipalities. Several other planning and transportation studies have been or are being prepared that include this portion of I-70. To outline the planning context within which this PEL Study originated, this section summarizes these other planning studies and shows how this Study relates to, and is consistent with, these other efforts.

1.3.1 State and Regional Trends Influencing Transportation Decisions

State and regional demographic, economic, and travel trends influence decision-making about an area's transportation system. These trends are part of the framework for establishing transportation goals at the state and regional levels. Various transportation studies including *A Vision for Missouri's Transportation Future* (MoDOT [2014] 2018b); *Connected2045 Long-Range Transportation Plan for the St. Louis Region* (EWG 2015); and *Moving Transit Forward, the St. Louis Regional Long-Range Transit Plan* (Metro 2010) (which is currently being updated), document these trends and are considered part of the planning context for this Study. Table 1-2 highlights some of the key state and regional trends documented in these plans.

Table 1-2: State and Regional Trends Influencing Transportation Decisions

State and Regional Trends	How These Trends Influences Transportation Decisions
Lower-income populations: In the Study Area, low-income populations vary widely, ranging from 8 percent (St. Charles County) to 36 percent (City of St. Louis) of the population (MoDOT 2017a).	Low income populations may rely more on alternative transportation modes, such as transit, ridesharing, walking, and bicycling.
Aging Population: The number of people over age 65 in the St. Louis region is expected to increase by 76 percent between 2014 and 2045, to make up approximately 25 percent of St. Louis' residents in 2045 (EWG 2015).	Older populations may rely more on alternative transportation modes, such as transit, walking, and bicycling. Access to healthcare facilities is an important need.
Population distribution: Recent migration trends indicate that large population growth will occur in suburban counties surrounding St. Louis in the next 30 years, with significant declines continuing in rural areas (EWG 2015). According to EWG, between 2010 and 2016, St. Charles County population grew 8.4%, St. Louis County population was level, and the City of St. Louis population declined by 2.5%.	Population growth may increase demand for roadway capacity improvements and alternate forms of transportation.
Freight Movement: The I-70 Study Corridor is a major freight route. Freight movement is critical to the economy of the St. Louis region and Missouri. Truck tonnage is forecasted to increase from 500 million in 2011 to 778 million in 2030, an increase of 55.6%. Trucks are forecasted to transport 56% of the freight tonnage and 59% of the freight value in 2030 (MoDOT 2017b).	Maintaining the quality and accessibility of the transportation system is critical to meet the import and export demands in the state and St. Louis region.

Table 1-2: State and Regional Trends Influencing Transportation Decisions

State and Regional Trends	How These Trends Influences Transportation Decisions
Transportation Funding: Many high-priority transportation projects in the Study Corridor are not fully-funded because of limited revenue available in Missouri.	Adding capacity or expanding the transportation system will remain a challenge until adequate funding is available to address transportation needs.
Sources: A Vision for Missouri's Transportation Future, Long-Range Transportation Plan (MoDOT [2014] 2018b) Connected2045, Long-Range Transportation Plan for the St. Louis Region (EWG 2015) Freight on the Move, Missouri State Freight Plan (MoDOT 2017b) Moving Transit Forward, St. Louis Regional Long-Range Transit Plan (Metro 2010) I-70 Planning and Environmental Linkages (PEL) Study Conditions Assessment Report (MoDOT 2017a) (Appendix A).	

1.3.2 State and Regional Transportation Goals

To be consistent with established plans and goals for the state and regional transportation systems, this Study reviewed state and regional plans that are pertinent to the Study Area. These plans identify agency goals and strategies for short- and long-term transportation and transit improvements. The plans shared many common goals. These are listed below and detailed in Appendix B:

- Maintain the transportation system
- Improve safety
- Improve reliability and reduce congestion
- Maintain and expand bicycle/pedestrian networks
- Maintain and improve transit services
- Support economic development and job growth
- Protect environmental resources

The goals for this Study are consistent with area plans, and are presented in Section 2.4.

1.3.3 Other Studies

Recent and ongoing studies that were reviewed for this Study are summarized in Table 1-3 (please refer to Section 1.4 of the *I-70 Planning and Environmental Linkages (PEL) Study Conditions Assessment Report* (Conditions Assessment Report – see Appendix A) (MoDOT 2017a) for more information):

Table 1-3: Other Studies Relevant to I-70 PEL Study Area

Study	Study Purpose, Concepts, or Alternatives
Improve I-70 Program Studies (1999, 2001, 2006, 2009)	<p>This is a series of studies to identify and address the improvement needs of I-70, between Independence (exit 15 at the I-470 interchange) and the Lake St. Louis interchange (exit 214). The series included a state-wide feasibility study (1999), a First Tier Environmental Impact Statement (EIS) (2001), and Second Tier studies (2006) (known collectively as "Improve I-70"). The studies divided the 200-mile I-70 corridor into seven sections of independent utility [SIU]). SIU 7 is the easternmost section that extends from Route 19 to I-64 and falls within the Study Area for this PEL study. Two improvement strategies ("Widen Existing I-70" and "Truck-Only Lanes") were evaluated. The 2009 Supplemental EIS expanded on and evaluated impacts of the Truck-Only Lanes Alternative and variations of that alternative for rural and urban settings. The <i>St. Louis Truck Lane Corridor Study</i> (Wilbur Smith Associates 2009) was prepared as part of the 2009 Supplemental EIS. The 2009 Record of Decision (ROD) selected the Truck-Only Lanes Alternative, which includes two truck-only lanes on the inside and two or more general purpose lanes on the outside in both directions (FHWA 2009). The ROD noted that the I-70 corridor evaluated did not include the city limits of Kansas City and St. Louis, and that any I-70 improvements in those locations would be evaluated under future separate studies. Status: Study completed.</p>
Mid Rivers Mall Drive/I-70 & Route 79/I-70 Interchange Study, February 2011 (City of St. Peters, MO)	<p>Improvements to reduce I-70 congestion and improve traffic flow at interchanges. Improvements included a diverging diamond interchange with bonus ramps at Mid Rivers Mall Drive, and Route 79 traffic operation improvements. The study evaluated a future fifth lane on I-70 between Mid Rivers Mall Drive and Route 79, with and without an option for a new North Outer Road. Status: Construction at Mid-Rivers Mall Drive Completed, Route 79 Traffic operation improvements are planned.</p>
Fifth Street Gateway Project, October 2011 (City of St. Charles, MO)	<p>Developed Fifth Street improvements from I-70 to 1st Capitol Drive, including aesthetics, traffic flow and safety, promoting pedestrian activity, road widening, intersection improvements, and streetscape improvements (construction is nearing completion). Status: Construction completed.</p>
Interstate I-70 Cave Springs Interchange Revision and One-Way Outer Roads between Cave Springs and Mid Rivers Mall Drive CMAQ Application, March 2012 (St. Charles County, MO)	<p>Improvements to relieve congestion at/near I-70/Cave Springs interchange and improve access along I-70 to/ from local roadway network between Cave Springs and Mid Rivers Mall Drive. Improvements included reconfiguring the I-70/Cave Springs interchange, and converting I-70 outer roads to one-way operation with slip ramps between Cave Springs interchange and Mid Rivers Mall Drive interchange. Status: Study completed, project not initiated.</p>
Congestion Reduction Study: I-70 Zumbuhl and Cave Springs Interchanges, May 2012 (City of St. Charles, MO)	<p>Evaluated solutions to alleviate congestion and accommodate future traffic at I-70 interchanges at Zumbuhl Road and Cave Springs. Short-term improvements included lane configuration adjustments and minor roadway widening. Long-term improvements included a single point urban interchange at both intersections, and converting I-70 outer roads to one-way operations. Status: Study completed, project not initiated.</p>
North Riverfront Commerce Corridor Land Use Plan, January 2013 (City of St. Louis, MO)	<p>Study of North Riverfront area north of downtown City of St. Louis and up to Maline Creek. Recommended improvements along I-70 to enhance connections to corridor and attract industrial development. Status: Study completed.</p>

Table 1-3: Other Studies Relevant to I-70 PEL Study Area

Study	Study Purpose, Concepts, or Alternatives
St. Louis Regional Freight Study, June 2013 (East-West Gateway Council of Governments)	Confirmed status of freight movement through St. Louis region, and future ability of local freight infrastructure to sustain job growth and economic opportunity. Provided physical and organizational recommendations to improve freight movement. Status: Study completed. St. Louis Regional Freightway established in 2014.
St. Louis Rapid Transit Connector Study, December 2013 (Metro)	An outgrowth of Metro's <i>Moving Transit Forward</i> , <i>St. Louis Regional Long-Range Transit Plan</i> , this study narrowed initial set of Bus Rapid Transit (BRT) highway corridors to two Locally Preferred Alternatives: the I-64 BRT line and the West Florissant-Natural Bridge Bus Rapid Transit (BRT) line. Status: Study completed; two alignments were recommended, but work is on hold due to overlap of Northside/Southside light rail transit (LRT) Study and ongoing security issues.
I-70 Traffic Flow Improvements Project, January 2014 (O'Fallon, MO)	Evaluated six-mile corridor through O'Fallon, and interchanges at Bryan Road, Route K, TR Hughes Boulevard, and Route 79. Evaluated alternatives to improve traffic flow, including converting and expanding outer roads to one-way operations along I-70; and corridor enhancements such as bicycle lanes, pedestrian facilities, and wayfinding signage. Status: Study complete. Improvements underway.
Missouri River Crossing Study, Spring 2016 (Great Rivers Greenway, Maryland Heights, St. Charles City, Bridgeton, and MoDOT)	Evaluated bicycle and pedestrian river crossing alternatives to improve connectivity across Missouri River near downtown St. Charles. Highest ranked alternative was I-70 Eastbound Blanchette Crossing in conjunction with barrier-separated facility on Missouri Route (MO) 370. Status: MO 370 Construction soon to be underway.
Cypress Corridor Study, 2015 (St. Ann, MO)	Assessed effects of roadway connection between Natural Bridge Road/Pear Tree Lane and Cypress Road. Explored improved access to the area and Lambert Airport, existing lane use, and future development potential along proposed roadway. Status: Study complete.
I-270 North Corridor Study, October 2012 (MoDOT)	Purpose of study was to assess the problems, needs, and opportunities, including traffic operations, geometry, and safety, on I-270, from Rte. 367 to Rte. 370. Status: Study completed.
I-270 North Environmental Assessment, November 2016 (MoDOT)	Addressed safety, mobility, congestion, accessibility, and aging infrastructure along I-270 in north St. Louis County (from I-70 to Chain of Rocks Bridge). Used information and preliminary concepts from the I-270 North Corridor Study (that only focused on a portion of the interstate) for more detailed analysis. Status: Study Complete, project listed on the STIP.
NorthPark Study, Ongoing as of this writing (NorthPark LLC)	Evaluated improvement alternatives at the I-70 and Hanley interchanges, as well as additional MetroLink stop at Springdale and I-70 to meet future travel demands of this new 550-acre business park located east of Lambert Airport. Status: Study is ongoing, expected that the No Build Alternative will be selected.
St. Louis Regional Freightway, Ongoing, 2017-2018 (Bi-State Development)	Established priority list of multimodal transportation projects that align economic development with the region's supply chain. Projects include improvements to I-70 from Natural Bridge Avenue to Hanley Road in St. Louis County, including safety and pavement improvements; and I-70/I-170 interchange improvements to address congestion and bottleneck issues. Status: Study is ongoing, plans and projects are updated annually to address congestion.
Municipal Bicycle & Pedestrian Master Plans – East-West Gateway, Trailnet, and Municipalities, various dates	Several cities along I-70 developed plans for infrastructure investments to accommodate bike/ped mobility to supplement the Gateway Bike Plan for local connectivity. These plans define local bike/ped networks and recommend facilities on key corridors. Status: Plans completed.

Table 1-3: Other Studies Relevant to I-70 PEL Study Area

Study	Study Purpose, Concepts, or Alternatives
Northside-Southside Light Rail Project for the St. Louis Region, 2018 (EWG)	Validated the Northside-Southside alignment, evaluated an alternative to that alignment to serve the proposed National Geospatial-Intelligence Agency site in the northwest quadrant of the North Jefferson Avenue/Cass Avenue intersection, and compared the two Northside alignments to select a locally preferred alternative. Status: Study Complete, Locally Preferred Alternative adopted by EWG Board of Directors in August 2018.
Proposed Preliminary Conceptual Planning Study and Comparative Evaluation of Potential MetroLink Corridors in St. Louis County, Mo, Ongoing as of this writing (St. Louis County, MO)	Establishes feasibility of extending the MetroLink system in three corridors within St. Louis. Corridors included MetroNorth that extends light rail from Clayton to north of I-270, which would need to cross I-70; the Daniel Boone corridor that extends light rail from MetroLink Blue Line north of Clayton to Westport; and MetroSouth that extends from terminus of MetroLink Blue Line in Shrewsbury along River Des Peres and South along I-55 to terminate at Butler Hill Road. Status: Study has been delayed.
O'Fallon Connected Corridor Study, 2016 (O'Fallon, MO)	Evaluates the north-south corridor extending from the Highway M/Route 79 interchange to the I-64/Highway K interchange. Study Corridor includes the I-70/Highway K interchange. Portions of Highway K and Highway M of this study will focus on developing a Pedestrian and Bicycle Improvement Plan for the corridor, and includes a new connection across I-70. Status: First phase of study completed June 2016.
Interstate I-70 Route U (Lucas-Hunt Road) Interchange Revision, 2018 (St. Louis County)	Will realign ramps from I-70 to Route U (Lucas-Hunt Road). Involves removing existing partial cloverleaf ramps and replacing with standard diamond interchange. MoDOT expects work to start in fiscal year 2018. Status: Construction underway.
Metro Reimagined Study (Metro)	A comprehensive operations analysis study with the goal to increase frequency on high-demand bus routes and modernize the system with technology to increase ridership. Improvements could affect traffic on roadways crossing I-70 in the City of St. Louis and St. Louis County. Status: In progress.

2.0 Study Vision and Purpose and Need

The Study team gathered information on existing conditions and planning efforts relevant to the Study Area, and engaged stakeholders and the public to understand the transportation needs in the Study Area. These needs helped in the formulation of a Vision Statement and goals for the Study Corridor. This chapter discusses the vision, goals, and transportation needs identified for I-70. For more information about the public and agency involvement conducted for this Study, please refer to Chapter 3.0.

2.1 Vision for the Study Corridor

The Study team, in collaboration with the TCIG, developed the I-70 corridor Vision Statement based on stakeholder and public input, and goals from local, regional, and statewide plans.

A Vision Statement describes a desired future condition or outcome. Establishing a long-term vision for the I-70 corridor was essential in determining the types of improvements that should be considered. The Vision Statement developed for this Study reflects statewide and regional transportation goals, as well as stakeholder and public desires for how I-70 will interface with and serve their communities. The Study team conducted extensive outreach efforts including meetings with local jurisdictions, interviews with key stakeholders, public meetings, and a widely distributed project survey, to determine what the citizens and representatives of communities in the Study Area want the I-70 Study Corridor to become. The Study team, which includes the Transportation Corridor Improvement Group (TCIG), developed the I-70 Study Corridor Vision Statement provided below. The TCIG is comprised of MoDOT, EWG, and Metro. Together, these agencies perform a central role in funding, building, and managing key components of the transportation network in the St. Louis area.

I-70 Corridor Vision Statement

The vision for the I-70 corridor between Wentzville and the Mississippi River is to provide a safe, well-maintained, interstate facility offering reliable mobility for all users into the distant future.

- ◆ By year 2045, the corridor will afford multi-modal transportation options, foster vibrant communities, lessen the highway's impact on neighborhoods that pre-date the interstate, and be a catalyst for economic development opportunities.
- ◆ The corridor will be made efficient through enhanced public transportation, and modernized and made smart to accommodate an array of new and emerging technologies, including connected vehicles (CV) and autonomous vehicles (AV).
- ◆ Communities along the corridor will thereby be effectively connected to the much larger intrastate and interstate roadway.
- ◆ At the regional level, commerce will be bolstered by efficient access to businesses, employment centers, and freight hubs, such as the St. Louis Lambert International Airport.

In conjunction with transportation improvements in the corridor, governments and private ventures will partner to coordinate investments that complement the I-70 transportation system and improve the economic vitality of the corridor.

A Purpose and Need statement is used in PEL and NEPA studies to articulate, and focus on, the specific problems to be addressed. The Purpose and Need is used to develop and evaluate alternatives, but is not made specific or biased toward a particular solution. It typically has three important parts: the Purpose, the Need, and the Goals, as illustrated below.



The I-70 PEL Purpose and Need summarized here is based on the analysis and findings documented in the Conditions Assessment Report (Appendix A), as well as input from stakeholders.

2.2 Purpose of this Study

The purpose of this Study is to investigate and identify the transportation problems in the I-70 corridor and to recommend strategies and options for corridor improvements that would:

- increase safety on the corridor for all users,
- manage existing and future traffic congestion,
- improve efficiency and reliability of freight movement,
- address substandard bridges and identified deficiencies in other physical assets; and
- improve multi-modal connections within and between communities and employment centers separated by the interstate.

2.3 I-70 Needs

The investigations documented in the Conditions Assessment Report (Appendix A) identified numerous transportation needs in the Study Area. These included pavement and geometric deficiencies, operational conditions affecting capacity and safety for all modes, and various factors impacting efficient movement of freight through the Study Corridor. Pavement repairs are currently programmed for the Study Corridor and are included in the No-Action Alternative (see Section 4.1). Therefore, pavement repairs are not identified as a project need in this Study. The transportation needs are summarized below.

2.3.1 Safety

Safety was identified as an issue in the Study Area.

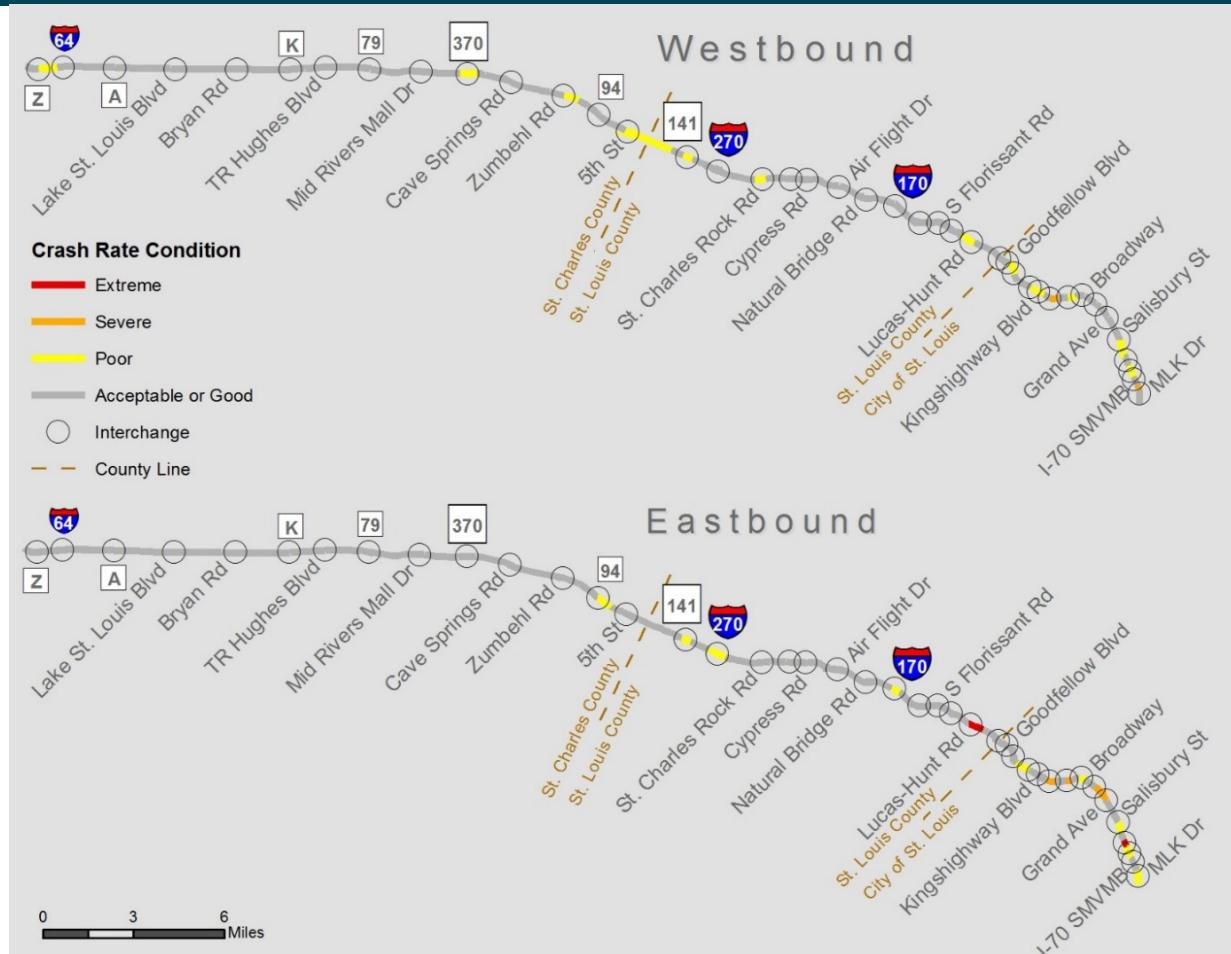
Most crashes on the I-70 mainline occurred at interchanges.

The results of the Conditions Assessment Report indicate that safety in the Study Area, for both motorized and non-motorized travel, is a key issue. All sections of the Study Corridor have higher vehicular crash rates than the statewide average. Clusters of pedestrian and bicycle crashes have also been identified in specific areas. Safety issues are summarized below.

Improvements are needed to address the causes of motorized and non-motorized crashes in the Study Area with the intent to reduce the vehicular crash rate to at or below statewide averages for similar facilities and improve safety for bicyclists and pedestrians.

Motorized

Crash history on I-70 over a five-year period (January 1, 2012 through December 31, 2016) was examined to locate crash clusters and identify crash types and severity in the Study Corridor. Crash rate conditions on I-70 in the Study Corridor were identified by comparing crash rates in specific I-70 segments to the average crash rate for the Study Corridor (Figure 2-1). Several segments between Mid Rivers Mall Drive and Florissant Road are rated poor. The segments east of Florissant Road located predominantly in the City of St. Louis exhibit the most safety problems, with numerous segments rated as poor, severe, or extreme. The other notable pattern is the proximity of crashes to interchanges. Approximately 79 percent of the I-70 mainline crashes between January 1, 2012 and December 31, 2016 were associated with traffic maneuvers at interchanges where drivers are entering and exiting the interstate.

Figure 2-1: Study Corridor Vehicular Crash Rate Conditions


Source: MoDOT, 2017.

Crash Severity

Highest rates of severe crashes occurred at Highway 141 in St. Louis County, at the Blanchette Bridge, and at several locations in the City of St. Louis.

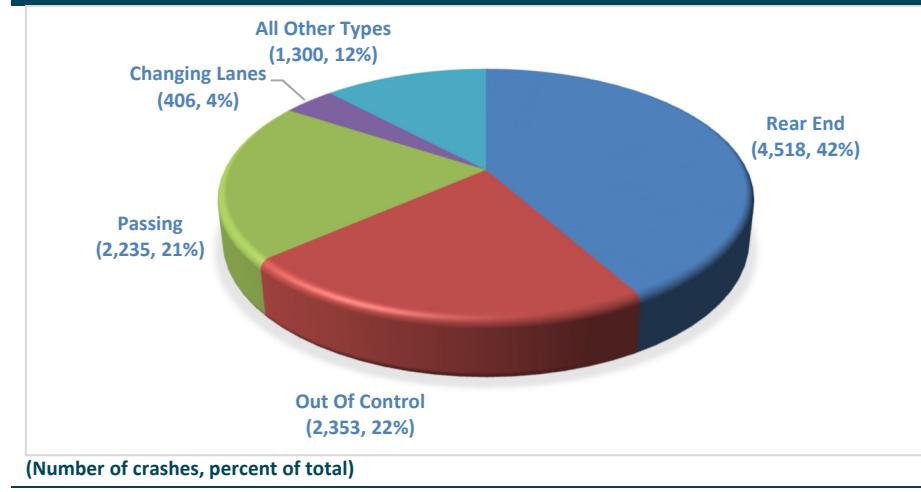
Crash history was also examined according to the severity of crashes. In the eastbound direction, the highest rates of severe crashes resulting in disabling or fatal injuries occurred at Highway 141 in St. Louis County and within a less than two-mile segment of I-70 in the City of St. Louis (between Riverview Boulevard and Bircher Boulevard, West Florissant Avenue, and Carrie Avenue). In the westbound direction, the highest rates of severe crashes occurred at the Blanchette Bridge over the Missouri River and at three locations in the City of St. Louis (9th Street, 3rd Street, and North Tucker Boulevard). Crashes are more severe and occur more frequently in the eastern portion of the Study Corridor in both directions.

Crash Types

"Rear-end" crashes, which often occur in congested conditions, were the predominant crash type on I-70.

Figure 2-2 illustrates the existing crash type distribution on mainline I-70 through the entire Study Corridor over the five-year study period. A total of 10,147 crashes were divided into 28 crash types based on MoDOT data. "Rear end" crashes were the predominant crash type followed by "out of control" and "passing" crash types. These crash types are typically related to congestion and to a lesser extent substandard geometrics and road conditions. Crash rates on I-70 for all crash types were generally highest in the City of St. Louis. Smaller concentrations of these crashes occurred around areas of recurring congestion or locations with substandard geometrics. With future increases in traffic congestion, safety issues are expected to worsen in the Study Corridor.

Figure 2-2: Vehicle Crash Types in the Study Corridor



Source: MoDOT, 2017.

Non-Motorized

Bicycle and pedestrian crashes were investigated within the Study Area using bicycle crash data from 2010 to 2015 and pedestrian crash data from 2011 to 2015. However, because data was not available on an annual basis, it was not possible to conduct a full or complete bicycle and pedestrian analysis to determine the rate at which crashes occur in a given area.

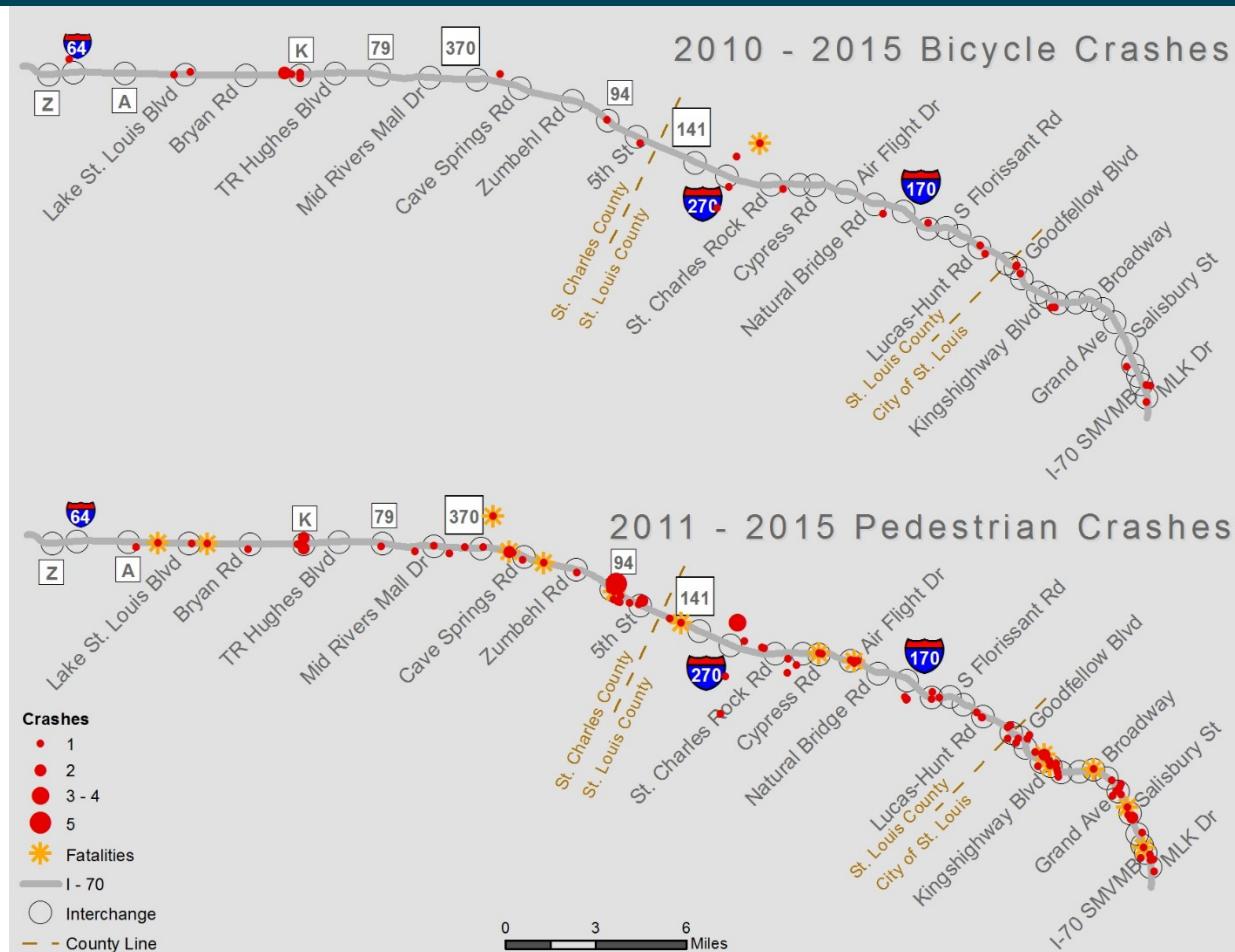
Bicycle Crashes

From 2010 through 2015, 29 bicycle crashes occurred within the Study Area. While crashes are distributed fairly evenly across the Study segments, six of the crashes occurred at Route K. Figure 2-3 shows the distribution of bicycle crashes in the Study Area between 2010 and 2015. More detailed maps are available in Appendix A.

Pedestrian Crashes

From 2011 through 2015, a total of 108 pedestrian crashes occurred in the Study Area. Approximately 30 percent of the crashes occurred in St. Louis City, with other crash clusters occurring near Route K, Cave Springs Road, Hwy. 94, I-270, and Air Flight Drive. Figure 2-3 shows the distribution of pedestrian crashes in the Study Area between 2011 and 2015. More detailed maps are available in Appendix A.

Figure 2-3: Bicycle and Pedestrian Crashes in Study Area



Source: *I-70 Planning and Environmental Linkages (PEL) Study Conditions Assessment Report*. May 2017 (MoDOT 2017a)

2.3.2 System Performance

As noted in the Conditions Assessment Report (Appendix A), congestion and travel delays contribute to higher-than-average crash ratings in the I-70 Study Corridor (compared to the statewide average for interstate facilities). This impacts the ability of the corridor to effectively provide regional connectivity. Within the Study Corridor, the existing annual average daily traffic (AADT) volumes along I-70 range from approximately 35,000 vehicles on I-70 west of I-64 to approximately 90,000 vehicles near the Blanchette Bridge. (Note that these numbers represent directional volumes and not total volumes.) The high percentage of commercial trucks along the corridor further compounds traffic issues.



According to MoDOT's *Bi-Monthly Mobility Report* (MoDOT 2017c), 23 percent of all freight incidents in the state occurred on I-70 and took an average of one hour to clear. Moreover, 4 of the 25 most severe freight bottleneck locations in Missouri are located along the section of I-70 within the Study Corridor. Freight is discussed further in Section 2.3.3. Study Corridor congestion has been a concern to drivers for many years, and is projected to worsen through 2045. Infrastructure improvements and more efficient use of infrastructure are needed to improve or maintain an acceptable Level of Service (LOS) through 2045.

LOS	Mainline Traffic Flow
A	Free Flow
B	Stable Flow
C	Stable Flow
D	Stable Flow
E	Unstable Flow
F	Forced Flow

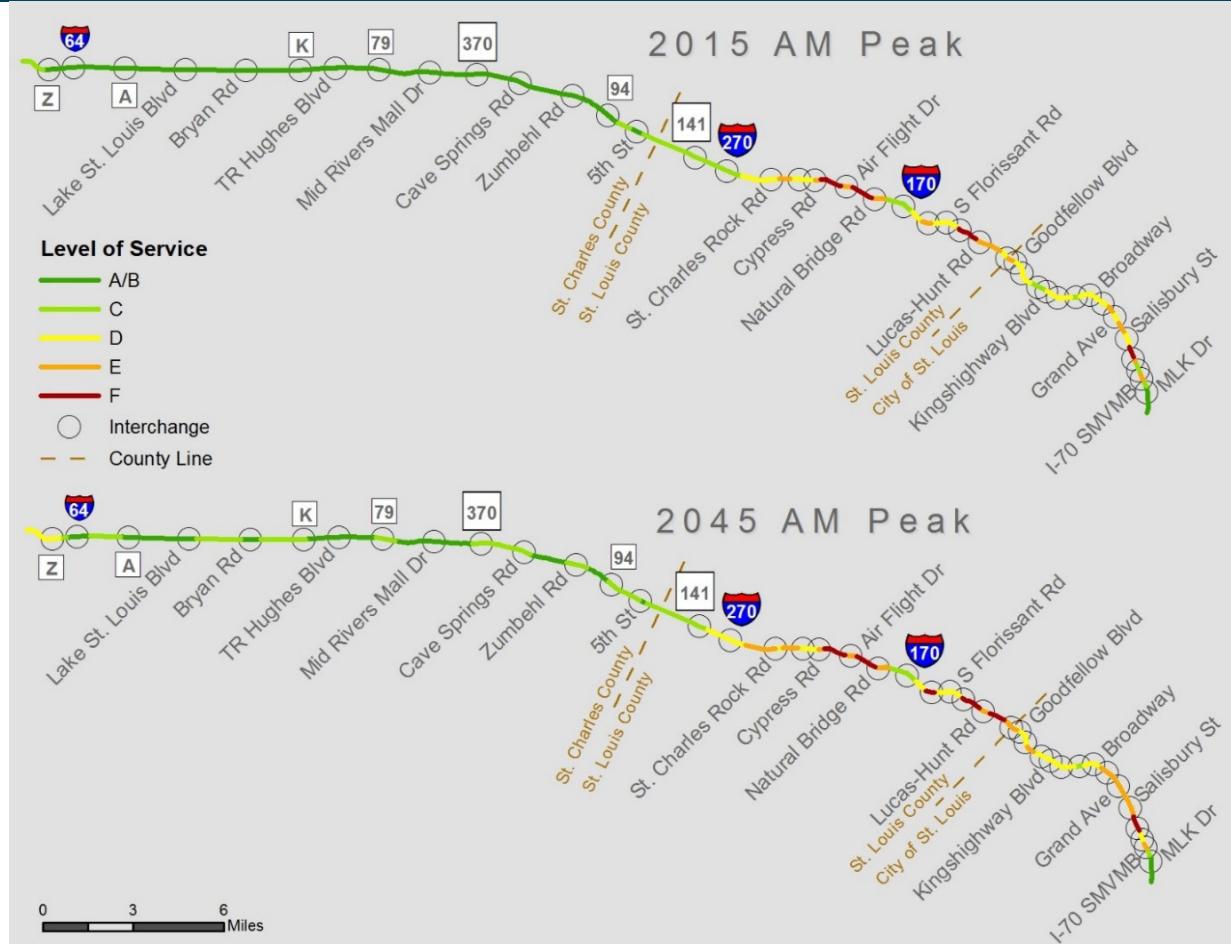
Level of Service (LOS)

LOS is rated on a scale from A through F, with A representing free flow traffic, and F representing breakdown flow. The acceptable peak hour LOS is E in urban areas. An urban corridor should operate at LOS E in the peak hour and LOS D in the off-peak hour in a 20-year traffic projection (MoDOT Engineering Policy Guide, Category 232) (MoDOT 2016b). The morning (AM) peak hours are 6:00 a.m. to 9:00 a.m. and the afternoon (PM) peak hours are 2:00 p.m. to 7:00 p.m. The EWG's 2015 Travel Demand Model (TDM) and fiscally constrained regional travel demand model, including the 2045 land use forecasts, were used to evaluate existing and future LOS for the Study Corridor. The fiscally constrained plan defines transportation elements and services to be provided over the next 25 years based on reasonably expected revenues.

As the following sections indicate, generally the eastern portion of the Study Corridor experiences AM and PM congestion in both the westbound and eastbound directions, whereas the western portion tends to experience reverse commute congestion, with AM congestion in the eastbound direction and PM congestion in the westbound direction.

AM Peak Hour Traffic (6:00 a.m. to 9:00 a.m.)
Westbound I-70

There are considerable differences in LOS for westbound traffic located east and west of the I-270 interchange. West of I-270, I-70 westbound traffic operates at LOS A/B or LOS C in the AM peak hour. East of I-270, more congested conditions exist, with most westbound segments operating at LOS D or below. These differences are largely because traffic passing through the St. Louis region bypasses downtown using I-270. By the 2045, more of I-70 east of I-270 will experience LOS E and F conditions in the westbound direction, while the portion of I-70 west of I-270 will continue to operate at LOS C or better. Figure 2-4 shows I-70 AM peak hour LOS for 2015 and 2045 in the westbound direction. (Note that the figures provided show directional volumes and not total volumes.)

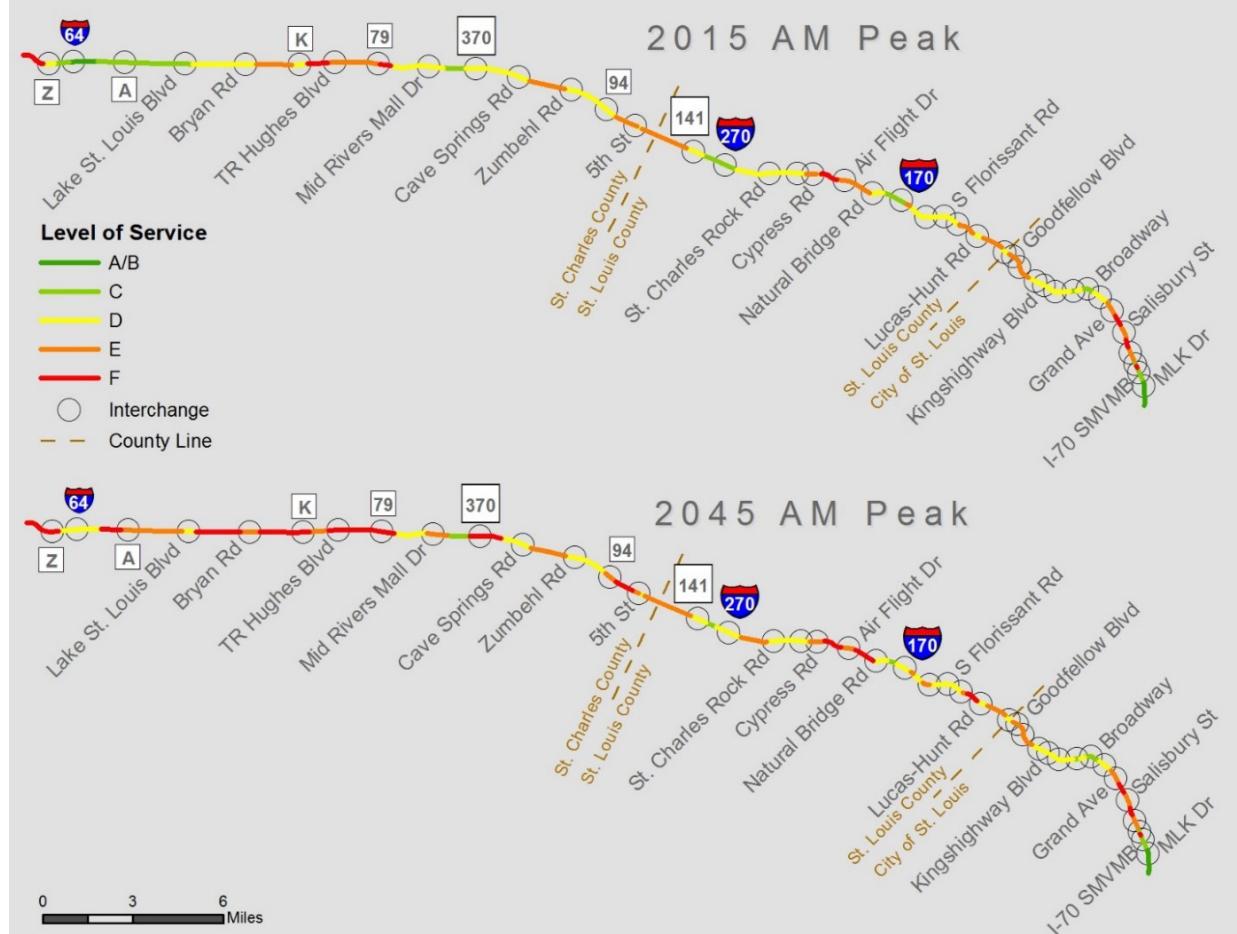
Figure 2-4: Westbound I-70 LOS for the AM Peak Hour


Source: EWG, 2017.

Eastbound I-70

In the eastbound direction, segments operating at capacity are spread more uniformly across the Study Corridor compared with the westbound direction. Approximately 35 percent of the Study Corridor experiences LOS E or F conditions during the AM Peak Hour. By 2045, conditions are projected to worsen, with approximately 57 percent of the Study Corridor operating at LOS E or F. The segments west of Cave Springs Road in St. Charles County show the most deterioration in LOS, in part due to high population growth rates in Wentzville, which experienced a population growth of over 28 percent between 2010 and 2016 (U.S. Census 2016). Figure 2-5 shows I-70 AM peak hour LOS for 2015 and 2045 in the eastbound direction.

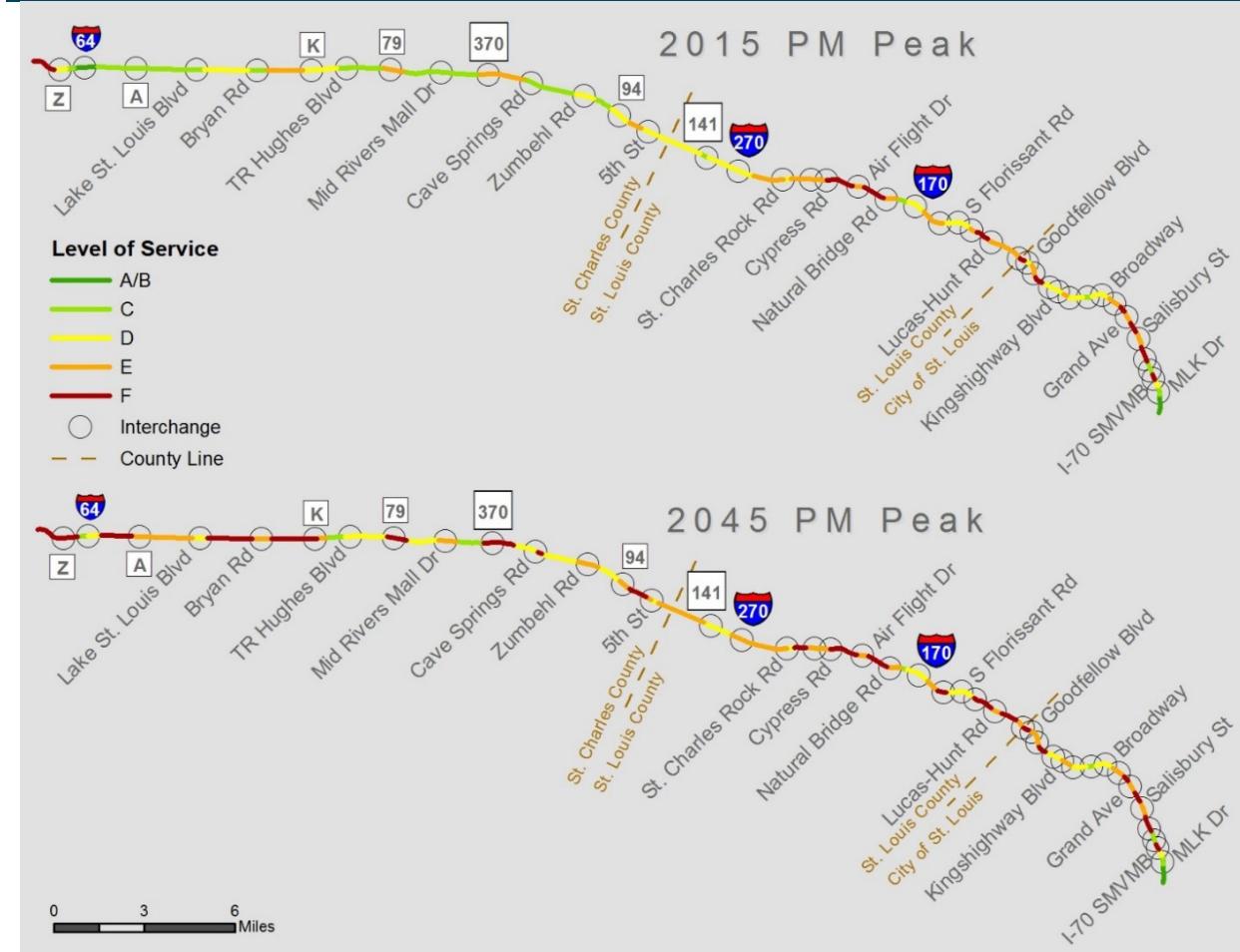
Figure 2-5: Eastbound I-70 LOS for the AM Peak Hour



Source: EWG, 2017.

PM Peak Hour Traffic (2:00 p.m. to 7:00 p.m.)
Westbound I-70

Approximately 36 percent of the Study Corridor operates at LOS E or D in the westbound direction during the PM peak hour. Congestion conditions are more severe east of the I-270 interchange compared to the portion of the Study Corridor west of I-270. Most of the Study Corridor east of I-270 operates at LOS E or F. West of I-270, most of the Study Corridor operates at LOS D or better. By the 2045 design year, conditions are projected to worsen, with approximately 62 percent of the Study Corridor operating at LOS E or F. This can largely be attributed to population growth in St. Charles County, which experienced an overall population growth of over 8 percent between 2010 and 2016 (U.S. Census 2016). Figure 2-6 shows I-70 PM peak hour LOS for 2015 and 2045 in the westbound direction.

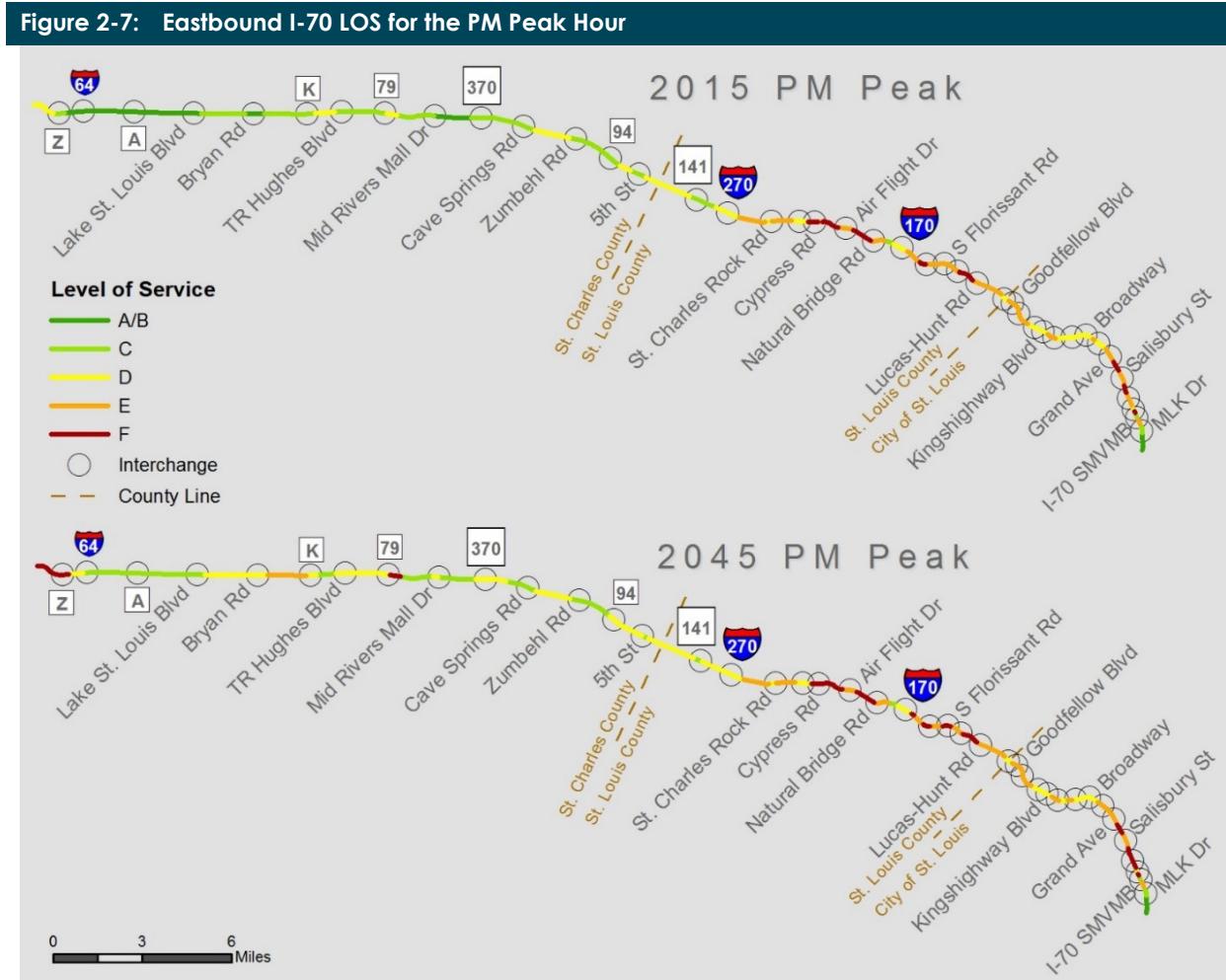
Figure 2-6: Westbound I-70 LOS for the PM Peak Hour


Source: EWG, 2017.

Eastbound I-70

Congestion conditions for eastbound traffic in the PM peak hour are similar to those experienced in the westbound direction in the AM peak hour. Similar to the westbound AM peak hour, there are considerable differences in LOS for eastbound traffic east and west of the I-270 interchange. West of I-270, I-70 eastbound traffic operates at LOS A/B or LOS C in most of the Study Corridor, with several locations operating at LOS D. East of I-270, more congested conditions exist, with most eastbound segments operating at LOS E or F. By the 2045 design year, more of the interstate east of I-270 will experience LOS E and F conditions. More of the interstate west of I-270 will experience LOS D conditions, with one location experiencing LOS E and two locations experiencing LOS F. Figure 2-7 shows I-70 PM peak hour LOS for 2015 and 2045 in the eastbound direction.

Figure 2-7: Eastbound I-70 LOS for the PM Peak Hour



Source: EWG, 2017.

Factors Contributing to Congestion in the Study Corridor

The following factors have been identified that contribute to congestion within the Study Corridor:

- **Substandard vertical and horizontal curves:** substandard curves on the interstate cause drivers to slow down. Reduced speeds during high-volume conditions result in traffic congestion. Substandard curves occur in several locations in St. Louis County and City of St. Louis, including locations between Cypress Road and Air Flight Drive, between I-170 and Hanley Road, between Goodfellow Boulevard and Union Boulevard, at Shreve Avenue, and between Florissant Avenue and Adelaide Avenue.
- **Inadequate shoulders:** several areas of the Study Corridor, including the segment between Bermuda Drive and Union Boulevard, have narrow or no shoulders. This results in disabled vehicles blocking traffic lanes, resulting in traffic congestion.
- **Tight interchange spacing:** the majority of interchanges in Segment 5 are spaced less than one mile apart, which is less than American Association of State Highway and Transportation Officials (AASHTO) recommendations for urban interchange spacing. Tight interchange spacing can result in reduced speeds because traffic entering and exiting the interstate is required to use the travel lanes for acceleration and deceleration as it enters and exits the interstate.
- **Substandard merge lanes:** at several interchanges in the Study Corridor, the lane length provided at on-ramps is insufficient for effective merging of traffic (for example [e.g.], St. Charles Rock Road and West Florissant Avenue interchanges). This issue is more prominent east of I-270.
- **Inadequate length of off-ramps:** at several interchanges in the Study Corridor, traffic exiting I-70 backs up onto the travel lanes because the length of off-ramps is inadequate (e.g., West Florissant Avenue and Shreve Avenue interchanges). This issue is more prominent east of I-270.
- **Heavy commercial vehicle traffic:** commercial trucks represent 18 to 20 percent of the traffic volume in the Study Corridor. The percentage of trucks is generally higher on interstate routes than on other routes, and the percentage of trucks on I-70 is fairly typical for interstate routes (Bureau of Transportation Statistics 2017). Because trucks generally have lower operating speeds and take longer to accelerate than passenger vehicles, they can worsen congestion.

2.3.3 Freight Movement

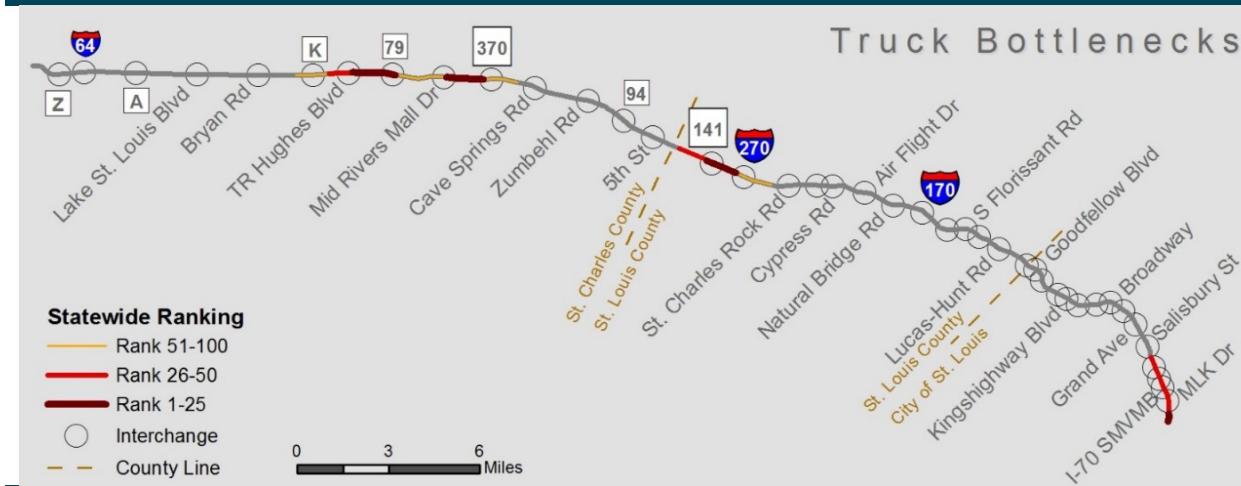
The I-70 Study Corridor is a major freight route that experiences heavy commercial truck traffic. In addition, six Class I railroads, as well as major ports on the Mississippi River, serve the St. Louis area. The Lambert Airport and MidAmerica St. Louis are significant air freight terminals (see the Conditions Assessment Report in Appendix A for details).

Several recent studies have documented the need for improvements to better serve freight. The EWG commissioned a report, *St. Louis Regional Freight Study* (EWG 2013), to evaluate freight infrastructure capacity and usage in the St. Louis Metropolitan area. In 2014, the EWG Board tasked the St. Louis Regional Freightway to develop the *2017 Freight Development Plan* (St. Louis Regional Freightway 2017). Also in 2014, MoDOT published *Freight on the Move, Missouri State Freight Plan* (which was updated in 2017) (MoDOT 2017b) to identify opportunities and actions to improve the Missouri freight transportation system.

The MoDOT *Freight on the Move* study identified freight bottlenecks in the state using global position system (GPS) data on truck locations and speeds. As noted in the study, a freight bottleneck is a section of road where traffic movement is limited by the road design. This is often a section of road with fewer lanes, a sharp curve, or access points where traffic is entering or exiting the road. A freight bottleneck is the most vulnerable point for congestion in a road network.

Four of the top 25 freight bottleneck locations in Missouri occur on I-70 within the Study Corridor.

The analysis showed that four of the top 25 freight bottleneck locations in Missouri occur on I-70 within the Study Corridor. Two freight bottleneck locations are located west of the Hwy. 370 and I-70 interchange, where closely spaced ramps are located near a large shopping district. Another freight bottleneck is located west of I-270, just east of the Missouri River crossing, and just west of the Lambert Airport where the volume of traffic accessing I-70 from I-270 causes substantial congestion. Also, an I-70 freight bottleneck is located just west of I-44 in downtown St. Louis along a long curve where interchange ramps are clustered together. (Note: all intersecting routes noted are referencing I-70 interchanges.) Figure 2-8 shows these freight bottleneck sections along I-70.

Figure 2-8: Location of Freight Bottlenecks on I-70

Source: *Freight on the Move* (MoDOT, 2014)

Another issue that impedes freight movement in the Study Corridor is vertical clearance at bridges. Additionally, most bridges that cross I-70 in the Study Corridor have substandard vertical clearances, which is a factor in limiting the movement of large payloads on I-70 through the Study Corridor. Please refer to the bridge discussion in Section 2.3.4 for more information.

Infrastructure improvements and more efficient use of infrastructure are needed to alleviate freight bottlenecks and increase reliability of travel times in the Study Corridor. The MoDOT *Freight on the Move* study identifies strategic projects that can make significant improvements to the freight system. Prioritized freight projects included capacity improvements to I-70 in St. Louis, as well as specific I-70 interchange improvements. In the I-70 Study Corridor, a planning project was recommended between Missouri highway Route (MO) 141 and I-270. Planning studies were recommended to address truck bottlenecking at locations with the highest 25 percent of commercial motor vehicle crash rates at I-70/Grand, I-70/ Kingshighway, US 67/I-70, and I-270/I-70.

2.3.4 Physical Conditions

Portions of I-70 within the Study Corridor were among the first to be constructed as part of the nation's Interstate Highway System beginning in 1956. While MoDOT's maintenance program has extended the original design life of the infrastructure, many elements are in need of repair or replacement to maintain function and meet current design standards.

Geometric Conditions

As stated above, portions of I-70 were constructed in the mid-1950s and do not meet current FHWA geometric standards for urban interstates. Geometric deficiencies within the Study Corridor include:

- **Shoulder Widths:** narrow inside and outside shoulder widths are inadequate to safely accommodate disabled motorists.
- **Entrance and Exit Ramps:** exit ramps are too short to safely allow motorists to exit, and short merge distances from the entrance ramps are insufficient to allow safe merging with mainline I-70 traffic.

Bridges

Of the 46 bridges in the Study Corridor, 17 are at or approaching their 50-year design life.

Substandard vertical bridge clearance is a limiting factor in moving freight through the Study Corridor.

The condition of bridges carrying I-70 and the clearance of bridges over I-70 are both vitally important to maintaining the Study Corridor as a major interstate highway and a primary commuting route in the St. Louis area. Most MoDOT bridges were designed for a 50-year life at the time of construction. Of the 46 I-70 bridges in the Study Corridor, 17 are at or approaching their 50-year design life. While the condition of most bridges is rated Very Good or Good, 19 are rated Fair and two are rated Poor. The poor bridges cross MO 141 and Belleau Creek.

In addition to serving as a primary commuter route, I-70 is a major truck traffic corridor for freight moving east from Kansas City through the St. Louis area to the East Coast. A limiting factor in the movement of large payloads through the Study Corridor is vertical clearance under bridges in the Study Corridor. Current bridge standards specify a minimum clearance of 16 feet 6 inches. Of the 46 bridges over I-70 in the Study Corridor, 31 have a substandard clearance (see Table 2-1). While all bridges over the interstate have at least 14 feet-8 inches of clearance, which will accommodate a standard trailer height (13 feet, 6 inches), this height is insufficient for the largest legal truck height permitted to use the Study Corridor (15 feet). Four bridges have clearance heights of less than 15 feet: Taylor Avenue, Adelaide Avenue, North Market, and the Great Rivers Greenway Trestle bike trail.

Table 2-1: Bridges Over I-70 with Less Than 16'-6" Vertical Clearance

Structure No.	Route/Road Carried	I-70 Direction of Travel	Minimum Vertical Clearance	Year Built or Reconstructed
L0624	US 61 S	West	16'-2"	1971
		East	15'-9"	1971
L0428	I-64 W	East	15'-11"	1971
		West	16'-5"	1971
A7043	Lake St. Louis Boulevard E	West	16'-5"	2003
A7043	Lake St. Louis Boulevard E	East	16'-3"	2003
A6053	S Woodlawn Avenue	East	16'-4"	1999
A4294	Route 79 S	East	16'-6"	1985

Table 2-1: Bridges Over I-70 with Less Than 16'-6" Vertical Clearance

Structure No.	Route/Road Carried	I-70 Direction of Travel	Minimum Vertical Clearance	Year Built or Reconstructed
A5952	Executive Center Parkway E	East (Outer Road)	16'-1"	2000
		West (Outer Road)	16'-1"	2000
A4040	Cave Springs Drive S	East	16'-3"	1982
		West	16'-3"	1982
L0887	St. Charles Rock Road E	East	16'-2"	1957
L0887	St. Charles Rock Road W	East	16'-2"	1957
L0888	Fee Fee Road S	East	15'-1"	1957
		West	15'-3"	1957
L0889	Lindbergh Boulevard S	West	15'-6"	1957
L0889	Lindbergh Boulevard N	West	15'-7"	1957
L0810	Natural Bridge Road N	East	15'-7"	1958
A4226	James S. McDonnell Boulevard S	West	16'-3"	1984
A3007	Ramp I-70 W to I-170 E	East	16'-3"	1981
A6233	Lucas and Hunt Road S	East	15'-11"	2001
		West	16'-5"	2001
A6234	Goodfellow Boulevard S	West	15'-11"	2001
A5976	Union Boulevard	East	15'-6""	1999
		*Express Lanes	15'-10"	1999
		West	16'-4"	1999
A6204	Kingshighway Boulevard S	East	16'-6"	2001
		West	15'-8"	2001
A6206	Shreve Avenue S	West	15'-2"	2001
A5984	West Florissant Avenue S	West	15'-5"	2000
A5986	Taylor Avenue E	West	14'-11"	2000
A6205	Carrie Avenue E	West	15'-9"	2001
A5960	Adelaide Avenue E	West	14'-11"	2000
A6238	McKinley Bridge W	West	15'-5"	2001
A6239	Route 115 / Salisbury Street S	West	15'-10"	2001
A0141	St. Louis Avenue E	East	16'-0"	1958
		*Express Lanes, Eastbound	15'-10"	1958
		West	15'-1"	1958
A0140	North Market Place (pedestrian) overpass	*Express Lanes, Eastbound	16'-6"	1958
		West	15'-2"	1958
		East	14'-11"	1958
A0139	Madison Street W	*Express Lanes, Eastbound	16'-6"	1958
		West	15'-1"	1958
A0138	Abandoned railroad	East	14'-8"	1958
		*Express Lanes, Eastbound	16'-6"	1958
A6417	70 W to Tucker Blvd. S	West	15'-8"	2013

Source: I-70 PEL Study Conditions Assessment Report (MoDOT 2017a) (Appendix A).

*Express lanes are reversible, but currently only travel in the eastbound direction.

2.3.5 Multi-Modal Mobility and Connectivity

One of the four goals identified in Missouri's long-range transportation plan, *A Vision for Missouri's Transportation Future*, (MoDOT [2014] 2018b) is to "Give Missourians better transportation choices." This theme is echoed in the *Connected2045 St. Louis Region Long-Range Transportation Plan* (EWG 2015), which identifies "Support Public Transportation" and "Provide More Transportation Choices" as two of its 10 guiding principles. These plans document multiple factors that demonstrate a need for improved multi-modal mobility and connectivity, including 1) aging population, 2) younger generations driving less, 3) increases in cost of driving, and 4) public health benefits of using alternate modes of travel. Better access to public transportation and increased quality and connections of bicycle and pedestrian facilities are needed to improve transportation choices in the Study Area.

Multi-Modal Mobility

Improving Study Area multi-modal mobility is an important component in meeting state and regional goals.

I-70 is one of the primary commuter routes between the City of St. Louis and suburbs in the northwest metro area. Therefore, improving multi-modal mobility in the Study Area is an important component of meeting these state and regional goals. The Conditions Assessment Report (Appendix A) details the various modes of transportation available in the Study Area. Transit in the Study Area currently includes MetroBus service between downtown St. Louis and St. Louis County, MetroLink service between downtown St. Louis and Lambert Airport, bus service in St. Charles, commuter service from St. Charles to the North Hanley MetroLink Station, and dial-a-ride service. No express routes exist for bus or rail service, and many of the bus routes extending to St. Louis County from downtown require connections through the North Hanley transit center.

Pedestrian access to transit is better in the City of St. Louis compared to other parts of the Study Area, because there are more transit routes, a higher frequency of transit service, land use is fairly compact, and most streets have sidewalks on both sides. Farther from the downtown area, pedestrian access to transit is reduced because of the lower number of transit routes, lower frequency of transit service, lower intensity of land use, and some roads that lack good pedestrian facilities. There are a number of bikeways in the Study Area, mostly consisting of roadway shoulders or shoulder bike lanes. Bikeways are discontinuous through the Study Area, and many intersections require improvements in order to increase mobility for bicyclists.

In *Moving Transit Forward, St. Louis Regional Long-Range Transit Plan* (Metro 2010), I-70 in the Study Corridor was ranked as one of five top priority corridors for extending Metro service, and was ranked as the third priority corridor for bus rapid transit (BRT). The Metro 2010 plan includes BRT along I-70 between the City of St. Louis and O'Fallon as well as three light rail

extensions from the City of St. Louis. One alignment would serve the northwest section of St. Louis County and two would serve North St. Louis County (or North County). Results from the MetroQuest survey conducted for the Envision I-70 planning process, which achieved over 2,600 responses, echoed input from the Metro 2010 and *Connected2045* plans. Numerous participants of the MetroQuest survey noted the need for a regional transit connection along I-70 and improved bicycle and pedestrian infrastructure, specifically in St. Louis and St. Charles counties.

Multi-Modal Connectivity

While I-70 provides a vital transportation link, it is also a barrier to multi-modal connections.

The I-70 Study Corridor provides a vital transportation link for communities along the length of the Study Area and for the St. Louis region. However, it also creates a barrier for multi-modal connections within and between communities and employment centers located on either side of the interstate. As shown in Table 2-2, there are a total of 51 crossings of I-70 throughout its 40-mile long stretch within the Study Corridor. Based on data in the Conditions Assessment Report (Appendix A), multi-modal connectivity across I-70 is highest in the City of St. Louis and decreases farther west from the urban core to the suburban areas of the Study Area. The report documents pedestrian and bicycle LOS for roadways in the Study Area. For routes crossing I-70, the percentage of routes with LOS D or lower is greater in St. Louis County and St. Charles County than in the City of St. Louis. Bus service across I-70 is also highest in the City of St. Louis and lowest in St. Charles County.

Table 2-2: Multi-Modal Connectivity Across I-70 in Study Corridor

Multi-Modal Considerations	City of St. Louis	St. Louis County	St. Charles County
Linear miles of I-70 in the Study Corridor	7	13	20
Number of I-70 roadway crossings	19	16	16
Percentage of I-70 crossings with bus routes	53%	50%	25%
Pedestrian level of service	LOS D or lower at 20 percent of crossings	LOS D or lower at 93 percent of crossings	LOS D or lower at 79 percent of crossings
Bicycle level of service	LOS D or lower at 73 percent of crossings	LOS D or lower at 80 percent of crossings	LOS D or lower at 90 percent of crossings

Source: The I-70 Planning and Environmental Linkages (PEL) Study Conditions Assessment Report (MoDOT 2017a) (Appendix A)

Based on a review of land use and transportation infrastructure, I-70 has a barrier effect on Study Area communities throughout much of Segment 4 and a portion of Segment 5. Factors contributing to the barrier effect in these areas include:

- A higher concentration of people with limited or no access to automobiles,
- neighborhoods that pre-date the interstate and were cut-off from community resources and/or employment centers when the interstate was constructed, and
- areas where transit service and/or bicycle and pedestrian infrastructure crossing I-70 is lacking.

Areas in Segments 4 and 5 that experience a barrier effect from I-70 are discussed below and shown on Figure 2-9 and Figure 2-10.

Segment 4:

- [I-270 to Hwy. 67 \(Lindbergh Boulevard\)](#): I-70 separates commercial, medical, and employment centers from residential areas. There are three roadway crossings in this section, with transit routes currently offered only along St. Charles Rock Road. Bicycle and pedestrian facilities crossing I-70 are inadequate in some cases and/or do not provide direct connections.
- [Hwy. 67 \(Lindbergh Boulevard\) to I-170](#): I-70 separates residential neighborhoods south of the interstate from Lambert Airport. While employees in these neighborhoods have access to shuttles, better pedestrian and bicycle infrastructure crossing I-70 would improve their transportation options.
- [I-170 to Florissant Road](#): I-70 separates University of Missouri St. Louis (UMSL) and NorthPark Business Center from residential areas. Bicycle and pedestrian facilities crossing I-70 are inadequate in some cases and/or do not provide direct connections.

Segment 5:

- [Lucas and Hunt Road to Shreve Avenue](#): I-70 separates neighborhoods, reduces access to parks and community centers, and reduces neighborhood access to employment centers, including the Mark Twain/I-70 industrial area. Bicycle and pedestrian facilities crossing I-70 are inadequate in some cases and/or do not provide direct connections.

Figure 2-9: I-70 Connectivity Barrier Effect in Segment 4



Figure 2-10: I-70 Connectivity Barrier Effect in Segment 5



2.4 Study Goals

Study goals complement the Purpose and Need statement and often help differentiate between alternatives. The goals identified below were derived from the vision that the TCIG and stakeholders have identified for the future of the Study Corridor. The goals are supported by data obtained from the *Assessment Report* and comments received from the public, key influencers, stakeholders, and advisory groups. Several of the project goals are applicable to the entire Study Area, while others are more focused on specific segments. These goals, which are not prioritized or ranked, are summarized in Table 2-3.

Table 2-3: Study Goals

Goal	Segment				
	1	2	3	4	5
Reduce potential for crashes, including crashes involving bicycles and pedestrians	✓	✓	✓	✓	✓
Maintain/preserve physical condition of infrastructure	✓	✓	✓	✓	✓
Improve LOS on mainline and at interchanges	✓	✓	✓	✓	✓
Improve efficiency of access to freight hubs to and from I-70	✓	✓	✓	✓	✓
Minimize/eliminate impediments to freight movement along I-70	✓	✓	✓	✓	✓
Allow improved accessibility to public transportation	✓	✓	✓	✓	✓
Improve active transportation to major destinations and the local network	✓	✓	✓	✓	✓
Minimize impacts to the natural environment	✓	✓	✓	✓	✓
Minimize impacts to the built environment	✓	✓	✓	✓	✓
Minimize construction issues, including disruption to utilities and the traveling public	✓	✓	✓	✓	✓
Reduce congestion on parallel road system	✓	✓			
Provide/improve interstate connections serving current/future development/redevelopment areas		✓	✓	✓	✓
Improve geometric configurations on I-70 to address high crash locations			✓	✓	
Improve access to Lambert Airport for passengers, employees, and freight/cargo				✓	
Optimize the function of the existing Express Lanes area				✓	
Increase transportation options for households without access to vehicles				✓	
Improve travel times between the City of St. Louis and suburban employment centers for households without access to vehicles				✓	

Stakeholder input was used in the development of the I-70 Study Corridor Vision Statement.

3.0 Agency Coordination and Public Involvement

The Study team conducted a comprehensive outreach program to engage agencies, stakeholders, and the public in the Study process and get their feedback on issues and needs within the Study Area. Their collective input was used to help formulate the vision and the Purpose and Need for the I-70 Study Corridor and identify issues to be considered in the conceptual strategies developed under this Study.

This chapter summarizes outreach activities undertaken for this Study, and input received in response to this outreach. For more details, refer to Appendix C, which provides correspondence, meeting announcements, meeting minutes, presentations, documentation of other outreach activities, and a complete list of the stakeholders discussed in the following sections.

3.1 Agency Coordination

3.1.1 Project Management Team

The project management team included MoDOT and EWG, with support provided by the consultant team of Jacobs, StratCommRx, and Added Dimension. Jacobs managed the overall Study efforts and coordination with the TCIG, which is comprised of MoDOT, EWG, and Metro. StratCommRx lead the agency, stakeholder, and public engagement program, with Added Dimension developing and maintaining the project website and providing public meeting support.

3.1.2 Key Influencers

The TCIG identified members of the community who would provide insights about the Study Area, including usage patterns and current and future needs related to I-70. These key influencers included major employers in the Study Area, such as the National Geospatial-Intelligence Agency (NGA) and Lindenwood University, as well as representatives of nonprofits, such as the Hispanic and Asian-American chambers of commerce. The Study team reached out to approximately 50 key influencers and conducted interviews with 16 individuals. An additional 41 key influencers were identified as the Study progressed, and were invited to complete an online Survey Monkey questionnaire about the Study. Nine key influencers completed the survey. Themes that emerged from key influencer input are summarized below. Please refer to Appendix C for more information.

- **Transportation:** Transit, bicyclists, pedestrians, freight, and commuter preferences should be considered as part of one transportation system.
- **Technology:** Autonomous vehicles, high-speed internet, charging stations and Smart City concepts need to be considered.

"This corridor traverses St. Charles County, City of St. Louis and St. Louis County.... We need to bring regional collaboration forward where everyone comes out a winner."
~Regional transit advocate

- **Connectivity:** Moving goods and people is a priority. Improvement is needed in signage, social justice impacts, and linking communities divided by a highway.
- **Aesthetics:** Although this is one corridor, the visual quality and setting differs greatly along the route. It is desired that a common design theme be established to visually unify the Study Corridor.
- **Safety:** Sight distance/visibility needs to be improved, lanes are too narrow in some areas, ramps have poor lighting, Express Lanes are no longer used as intended, and on- and off-ramp access needs to be more frequent and reconfigured in some locations.

3.1.3 Senior and Technical Advisory Groups

Two advisory groups were formed to provide input to the Study. The Senior Advisory Group (SAG) consisted of local officials and representatives of regional organizations and agencies from the City of St. Louis, St. Louis County, and St. Charles County. The Technical Advisory Groups (TAG) consisted of technical staff from municipalities within the Study Area, support agency representatives, and regional partners who offered technical insights.

Senior Advisory Group

A SAG was formed to provide input about the overall needs of the Study Area, and helped to identify and define the goals for this Study. The SAG included representatives from the following municipalities, local agencies, businesses, and academic institutions in the Study Area:

The Senior Advisory Group provided input about overall needs of the Study Area.

- Bi-State Development (Metro)
- City of St. Louis
- East-West Gateway Council of Governments (EWG)
- Economic Development Center (EDC) Business & Community Partners
- Great Rivers Greenway
- Greater St. Charles Chamber
- Greater St. Charles Convention and Visitors Bureau
- Lindenwood University
- Missouri Department of Transportation
- Municipal League of Metro St. Louis
- St. Charles County
- St. Charles Economic Development Corporation
- St. Louis Convention and Visitors Center
- St. Louis County
- St. Louis Development Corporation
- St. Louis Economic Development Partnership
- St. Louis Lambert International Airport
- St. Louis Port Association

- St. Louis Regional Chamber
- St. Louis Regional Freightway
- University of Missouri-St. Louis

The SAG meetings are summarized below (see Appendix C for more information).

- **July 31, 2014:** Introduced the Study, discussed the Purpose and Need, identified strengths and weaknesses in the Study Corridor, and obtained input on the vision for the Study Corridor.
- **March 2, 2017:** Reinitiated the Study (which had been placed on hold in October 2014), discussed schedule and scope of Study, identified issues to be considered in development of the Purpose and Need, and helped identify the goals.
- **August 23, 2017:** Provided updates on the Study and public engagement activities, and presented the Purpose and Need and range of alternatives.

Technical Advisory Groups

The Technical Advisory Groups provided technical input for practical solutions in their segment of the Study Area.

Three TAGs were established for this Study, organized by the City of St. Louis, St. Charles County, and St. Louis County within the Study Area. Each TAG consisted of representatives from the city and respective counties and municipalities and stakeholders located therein. The TAGS provided technical knowledge and insights into practical solutions for their segment of the Study Area, and are listed in Table 3-1:

Table 3-1: Technical Advisory Groups (TAGs)

St. Charles County TAG Members	St. Louis County TAG Members	City of St. Louis TAG Members
<ul style="list-style-type: none"> • City of Lake St. Louis • City of O'Fallon • City of O'Fallon Economic Development • City of St. Charles • City of St. Peters • City of Wentzville • St. Charles Area Transit • St. Charles County • St. Charles County Dept. of Transportation • St. Charles County Highways Dept. • St. Charles Dept. of Engineering 	<ul style="list-style-type: none"> • City of Berkeley • City of Bridgeton • City of Cool Valley • City of Edmundson • City of Ferguson • City of Jennings • City of Maryland Heights • City of Normandy • City of Northwoods • City of Pasadena Hills • City of Pine Lawn • City of Woodson Terrace • Great Rivers Greenway • St. Louis County • St. Louis County Dept. of Highways, Traffic, and Public Works • St. Louis County Dept. of Planning • University of Missouri-St. Louis • St. Louis Lambert International Airport 	<ul style="list-style-type: none"> • City of St. Louis • City of St. Louis Traffic Division • Great Rivers Greenway • Project Connect • RideFinders • City of St. Louis Board of Public Service • St. Louis Development Corporation • St. Louis Planning and Urban Design

The Study team met with the TAGs at key points in the Study to provide updated Study information and obtain input at that stage of the Study. The meetings are summarized in Table 3-2 (refer to Appendix C for more information).

Table 3-2: TAG Meeting Summary

Meeting Date	TAG	Meeting Purpose
July 28, 2014	City of St. Louis	Introduce Study, and obtain information to develop the Purpose and Need Statement.
July 28, 2014	St. Charles County	Introduce Study, and obtain information to develop the Purpose and Need Statement.
July 29, 2014	St. Louis County	Introduce Study, and obtain information to develop the Purpose and Need Statement.
March 1, 2017	All TAGs	Reinitiate the Study (which had been placed on hold in October 2014), discuss schedule and scope of Study, and identify issues to be considered in development of the Purpose and Need
August 17, 2017	St. Charles County	Present Study status update; public involvement efforts to date; Purpose and Need, and range of alternatives.
August 17, 2017	City of St. Louis	Present Study status update; public involvement efforts to date; Purpose and Need, and range of alternatives.
August 23, 2017	St. Louis County	Present Study status update; public involvement efforts to date; Purpose and Need, and range of alternatives.
June 4, 2018	St. Charles County TAG members	Provide briefing on revised Study approach, vision, and strategies.
June 5, 2018	City of St. Louis TAG members	Provide briefing on revised Study approach, vision, and strategies.
June 5, 2018	St. Louis County TAG members	Provide briefing on revised Study approach, vision, and strategies.
June 10, 2018	St. Louis County TAG members (Lambert Airport)	Provide briefing on revised Study approach, vision, and strategies.
June 21, 2018	All TAGs	Present updated Study vision, and strategies and decision processes for PEL Study.

Joint SAG/TAG Meetings

The Study team held two joint meetings with the SAG and TAG on July 18 and 19, 2018 to update members on Study findings and conceptual strategies developed, as summarized below (see Appendix C for more information).

- July 18, 2018: Representatives from the following SAG and TAG members attended this meeting:
 - St. Charles County
 - City of St. Charles
 - City of Wentzville
 - City of Lake St. Louis
 - City of Maryland Heights
 - Municipal League of Metro St. Louis

- City of Pine Lawn
- City of O'Fallon
- July 19, 2018: Representatives from the following SAG and TAG members attended this meeting:
 - EWG
 - St. Charles County
 - St. Louis County
 - City of St. Louis
 - City of Woodson Terrace
 - Lambert Airport
 - University Square
 - University of Missouri – St. Louis

Meeting discussions included questions about the timeframe for completing this Study and advancing projects to the NEPA phase, the extent of the Study Area, and what resources were considered in this Study such as population growth and economic development.

3.1.4 Agency Scoping Meeting

The Study team held a scoping meeting on June 28, 2017, in Jefferson City with local, state, and federal resource agencies to obtain their input on the scope of issues to be addressed in this Study and the Study's Purpose and Need. A second meeting was held on July 26, 2018 via webinar with the same agencies to present the conceptual strategies developed under this Study and the prioritization process. Table 3-3 lists resource agencies invited to participate in these meetings, and indicates meeting participants. During these meetings, agencies who participated received information about the Study and were given the opportunity to comment.

Table 3-3: Resource Agency Coordination

Resource Agencies Invited to Participate	Meetings	
	Attended June 28, 2017 Scoping Meeting	Attended July 26, 2018 Meeting
Environmental Protection Agency		X
Federal Aviation Administration	X	
Federal Emergency Management Agency		
Federal Highway Administration	X	X
Federal Transit Administration – Region 7	X	
Illinois Department of Transportation		
Missouri Department of Conservation		
Missouri Department of Natural Resources	X	
Missouri Department of Public Safety		
Missouri State Historic Preservation Office		
U.S. Army Corps of Engineers		
U.S. Department of Agriculture	X	

Table 3-3: Resource Agency Coordination

Resource Agencies Invited to Participate	Meetings	
	Attended June 28, 2017 Scoping Meeting	Attended July 26, 2018 Meeting
U.S. Department of Housing and Urban Development		
U.S. Department of the Interior – Natural Resource Conservation		
U.S. Department of the Interior – National Park Service		
U.S. Department of the Interior – U.S. Fish and Wildlife Service	X	

Agency scoping comments and questions received are summarized below. These questions and concerns were discussed during the scoping meeting and were taken into consideration during the development, screening, and ranking of conceptual strategies.

- **Safety:** Did the Study focus more on safety concerns or environmental issues/historical preservation? How will the success of safety improvements be gauged across the Study Corridor?
- **Freight:** Is there a plan for reaching out to freight companies?
- **Data Analysis:** How was data on existing conditions obtained? How did the Study consider different levels of input received throughout the Study Area? For example, only 14 comments were received in North City, and substantially more were received in areas farther west.
- **Development:** Did you identify places for future development (that is [i.e.], places to stop that are easy for travelers to get on and off the highway easily)?
- **Study Specific:** What is the intent of this Study? How will the Study and its findings be attractive to businesses and people? What is the timeframe to complete this Study and what are the next steps?

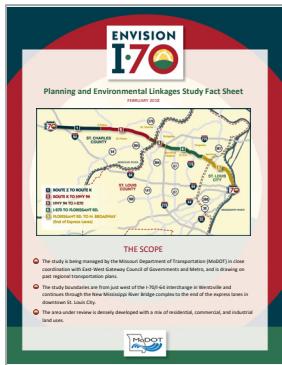
Comments received at the July 2018 meeting, and responses, are summarized below:

- Why is the term “segment” used? Is that term required by NEPA or FHWA? Will an environmental assessment/environmental impact statement (EA/EIS) be conducted across the corridor?
- The MetroQuest survey was a great idea.
- Raegan Ball (FHWA) indicated that she would work in collaboration with Richard Moore (MoDOT) on any additional needs.

3.2 Public Involvement

3.2.1 Announcement/Information Distribution Methods

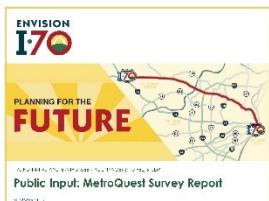
Several methods were used to announce public meetings; announce the on-line survey; and distribute information about the Study, including fact sheets, maps, and timelines. These methods are summarized below; please refer to Appendix C for details.



Project Fact Sheet, 2018



Project website



MetroQuest Survey Report

- Press releases were distributed to the St. Louis Post-Dispatch, St. Louis American, KSDK-TV, KMOV-TV, KTVI-TV, St. Louis Public Radio, KMOX Radio, and other media outlets.
- Project and public meeting information was provided to SAG and TAG members to publicize prior to public meetings.
- Two newsletters announcing public meetings were sent to TAG and SAG members to distribute prior to public meetings.
- Project information and local news coverage were placed on MoDOT and EWG Facebook pages.
- A flier announcing the online survey (MetroQuest) was provided to the main offices of St. Charles City and County Library (12 locations), St. Louis County Library (17 locations), and St. Louis Public Library (16 locations), to be placed near publicly-accessible computer terminals.
- A project fact sheet was provided to TAG and SAG members to distribute.
- A project website was launched (www.envision70.com) to provide project information, including Study description, reports, maps, timelines, upcoming meetings, meeting materials and summaries, and on-line survey results.

3.2.2 MetroQuest Survey

A MetroQuest online survey was conducted over a 90-day period (from February 24 to May 24, 2017) to obtain input on Study topics such as congestion, safety, bicyclist and pedestrian facilities, and transit. The survey was announced through a press release, public meetings, fliers placed at local libraries, and social media. The survey had a high level of participation, with more than 2,600 individuals completing the survey, generating more than 40,000 individual data points. Media efforts, including the press release and social media outreach, resulted in publication of several articles that helped generate this high level of participation. While survey comments were received about areas relatively evenly distributed along the Study Corridor, the majority of individuals who provided survey comments live in St. Charles County, with City of St. Louis residents notably underrepresented in the survey feedback. As such, input from City of St. Louis community leadership

was sought to offset this disparity. Survey results are summarized in Section 3.2.4. Please refer to Appendix C for a full report on the MetroQuest survey results. This report can also be downloaded from the Study website (www.envision70.com). Due to the high level of participation in the survey, the survey report does not include individual responses and data points. However, the complete data set generated by the survey is available upon request from the MoDOT District Planning Manager of the St. Louis Planning and Local Programs office.



July 18, 2018 Public Meeting

3.2.3 Public Meetings

The Study team held meetings with public officials and members of the public to present information about the Study and gather input on Study Area issues and concerns to be considered in formulating the Purpose and Need for the Study and during development of conceptual strategies. These meetings are summarized in Table 3-4.

Table 3-4: Public Meeting Summary

Meeting Date	Meeting Purpose	Meeting Location
Public Officials Briefings		
March 30, 2017	Reinitiate Study (which was put on hold in October 2014), purpose of Study, obtain input on Study Purpose and Need	Normandy
April 7, 2017	Reinitiate Study (which was put on hold in October 2014), purpose of Study, obtain input on Study Purpose and Need	St. Charles
July 18, 2018	Present Study vision, strategies and goals	O'Fallon
July 19, 2018	Present Study vision, strategies and goals	St. Louis
Public Meetings		
March 30, 2017	Study background and purpose; obtain input to consider in Purpose and Need; present ways to participate, and announce online survey	Normandy
July 18, 2018	Present Study vision, strategies and goals	O'Fallon
July 19, 2018	Present Study vision, strategies and goals	St. Louis

3.2.4 Summary of Public Comments Received

During the course of this Study, public comments were received via the MetroQuest online survey, public meetings, emails, and key influencer interviews. While the Study largely focused on higher-level issues and overall vision, strategies, and goals for the 40-mile Study Corridor, the public tended

to comment on specific issues. Over 3,700 public comments were received during this Study, suggesting that outreach efforts were effective. Comments were reviewed and categorized for consideration. The key themes emerging from the collective set of comments received, which echo the input received from advisory groups and key influencers, were the basis for the I-70 Corridor Vision Statement, the Study Purpose and Need, and the Study goals discussed in Chapter 1.0 of this report. These elements guided the development, screening, and ranking of conceptual strategies as discussed in Chapter 4.0. Table 3-5 summarizes all public comments received (see Appendix C for details).

Table 3-5: Summary of Public Comments Received

Comment Theme	Comments
Safety	<ul style="list-style-type: none"> • Improve signage to better identify exits. • Straighten curves to improve safety and reduce bottlenecks. • Lengthen interchange on- and off-ramps and eliminate sharp curves to improve safety. • Widen shoulders, especially in the county and City of St. Louis, to provide safer area for moving accidents or broken down vehicles off the highway.
Congestion	<ul style="list-style-type: none"> • Add HOV [high occupancy vehicle] lanes for carpools and buses. • Increase number of lanes to accommodate traffic. • Improve function of interchanges. • Widen on- and off-ramps – add lanes to improve their safety and function. • Improve signage for exit only lanes to provide drivers with more advance notice of exits. • Add special lanes for truckers to remove them from general lanes and reduce congestion. • Improve area between Highway 94 and Highway K on I-64 to eliminate bottlenecks.
Freight Movement	<ul style="list-style-type: none"> • Create dedicated or express lanes for trucks and other heavy vehicles to improve freight movement. • Widen ramps and reduce sharp curves to accommodate large vehicles.
Transit	<ul style="list-style-type: none"> • Improve and expand transit overall to reduce congestion and improve ridership. • Improve transit service from North Hanley through St. Charles County. • Provide transit all the way to Wentzville to serve growing population west of St. Louis. • Would like express rail provided for those commuting to the city every day.

Table 3-5: Summary of Public Comments Received

Comment Theme	Comments
Bicyclist/ Pedestrian Facilities	<ul style="list-style-type: none"> • Improve and expand bicycle and pedestrian network/connectivity overall. • Improve signage/wayfinding along regional trail. • Build pedestrian bridge across river. • Add a bicycle/pedestrian lane on the outside of the I-70 Blanchette Bridge to provide safe and legal passage for the many pedestrians and bicyclists that use the bridge. • Improve pedestrian access from Lambert Airport/MetroLink station to the hotels on the other side of I-70. • Improve bicycle crossings – provide better access points for bikes to safely cross over/under I-70. For example, the short weave at Lindbergh makes it difficult for bicyclists to cross I-70 at that location.
Wayfinding	<ul style="list-style-type: none"> • Improve airport access. • Improve signage for exits to provide drivers with more advance notice of exits. • Modify interchanges so that they are not confusing. • Improve Highway 61 connection to I-70 West and I-70 West connection to Highway Z.
Environment	<ul style="list-style-type: none"> • Protect the few green spaces that currently exist. • Plant more trees, foliage/flowers along highway and around interchanges. • Fix trash from Lucas & Hunt flowing into community pond via storm sewers. • Stop building in/polluting floodplain.
Community Development	<ul style="list-style-type: none"> • Pay attention to underserved/underutilized communities along I-70. • Better access to outer roads for business and future development. • Easier access to the airport and surrounding community/businesses.

4.0 Strategy Identification, Development, and Evaluation

This chapter explains how the various strategies for achieving the Purpose and Need and corridor vision were identified, prioritized, and evaluated to develop recommended strategies and improvement options in the Study Area. Key steps in this process are summarized below and described on Figure 4-1:

- **Step 1** – Understand the Needs
- **Step 2** – Establish a Vision and Purpose
- **Step 3** – Determine Specific Goals
- **Step 4** – Identify and Prioritize Strategies
- **Step 5** – Explore and Evaluate Solutions
- **Step 6** – Develop Recommendations

4.1 No-Action Alternative

The No-Action Alternative consists of transportation infrastructure projects in the Study Area that are reasonably foreseeable or are in progress. Reasonably foreseeable projects include those with identified or committed funding that would be constructed whether or not any improvements/recommendations cited in this PEL Study are implemented. Table 4-1 lists projects included in the No-Action Alternative. The No-Action Alternative serves as a baseline comparison for operational, safety, benefit-to-cost, and environmental analysis purposes.

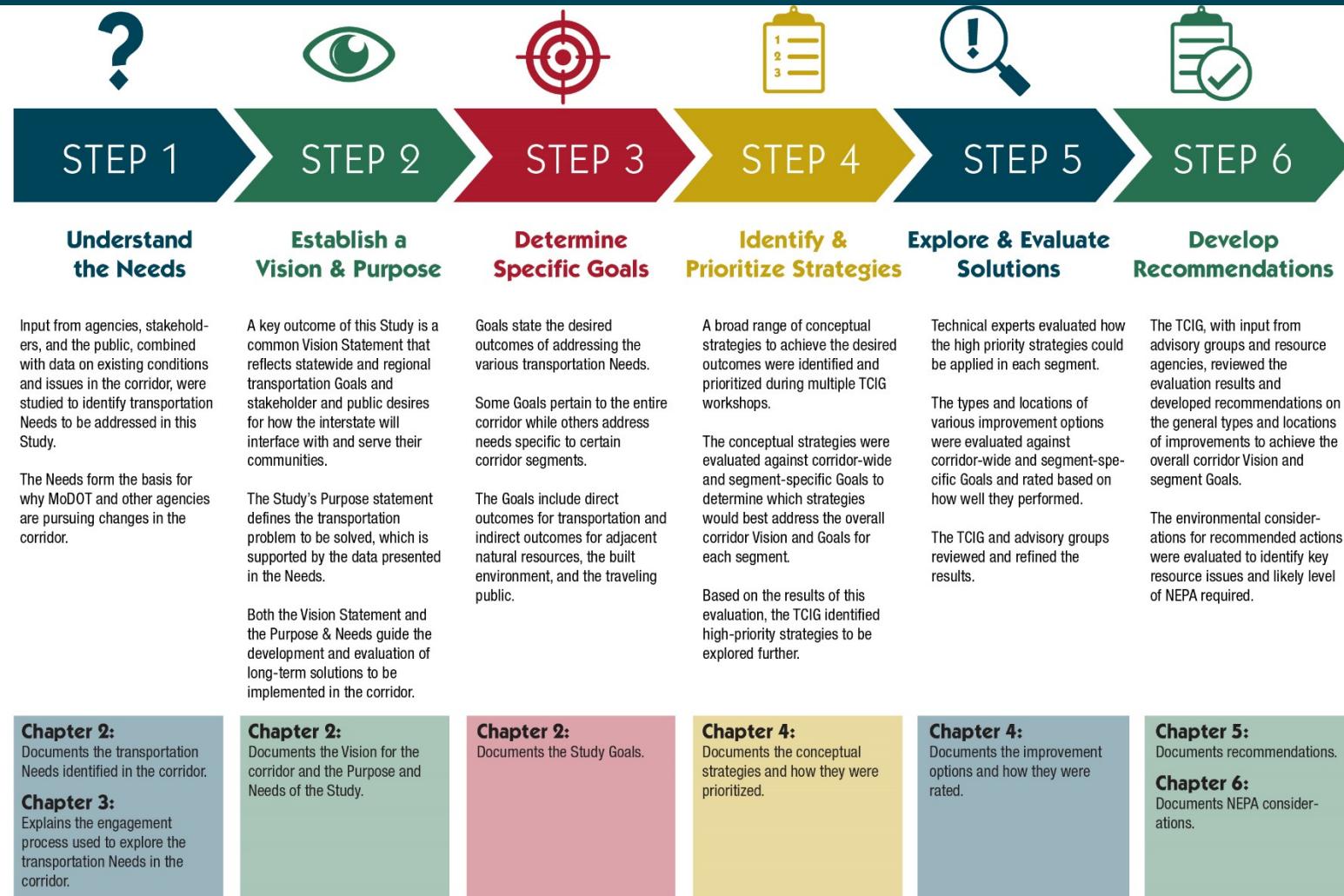
Figure 4-1: Key Steps in Process to Develop Recommendations


Table 4-1: Projects Included in the No-Action Alternative

Applicable I-70 PEL Study Segment	Project Description	Agency Job Number (If Applicable)	Source
Bicycle and/or Pedestrian Expansion Projects			
1,2	Pedestrian improvements at I-70 and Hwy. K/ Main Street, from Veterans Memorial Parkway to Terra Lane. Project includes 10-ft. shared use path and 8-ft. sidewalk.	5537B-17	EWG Transportation Improvement Program (EWG TIP) Fiscal Years 2018-2021
3	Construction of bicycle/pedestrian bridge over Missouri River.	TAP-7303(615)	EWG Transportation Improvement Program (EWG TIP) Fiscal Years 2018-2021
ITS Projects			
3,4	2018-2022 Intelligent Transportation System (ITS) Program-Interconnect Cameras & Beacons	1689	St. Louis County 5-year Capital Plan
	2018-2022 ITS Program-Advanced Detection Improvements	1688	St. Louis County 5-year Capital Plan
Not Location Specific	ITS maintenance and operations in various locations in the St. Louis District.	6806Y-21 / 6Q3173E & 5948D-18 / 6Q3053E	EWG TIP Fiscal Years 2018-2021
	ITS improvements to dynamic message signs in various locations in the St. Louis District.	6806T-18 / 6Q3284	EWG TIP Fiscal Years 2018-2021
Maintenance/Americans with Disability Act (ADA) Compliance Projects			
1	Pavement and bridge improvements on I-70 and US 61/I-64 interchange ramps.	6705G-17 / 6I3182	MoDOT 2018 -2022 Statewide Transportation Improvement Program (STIP)
	I-70 pavement improvements from west of Wentzville Parkway to Lake St. Louis Boulevard.	6705J-17 / 6I3195	MoDOT 2018 -2022 STIP
	Bridge improvements at I-70 and Pitman Avenue.	6811N-18/ 6P3331	EWG TIP Fiscal Years 2018-2021
	Lake St. Louis Boulevard Phase 2 (Lake St. Louis) – federally funded pavement and safety improvements.	CRB16-012	St. Charles County TIP 2017-2019
1,2	Pavement improvements on I-70 north and south outer roads.	6706A-17 / 6S3183	EWG TIP 2017-2021
1,2,3	Guardrail repair at various locations in St. Charles County.	6811E-15 / 6P3309	EWG TIP Fiscal Years 2018-2021
2	Pavement improvements on I-70 Outer Road from State Highway (SH) 79 to SH 94/1 st Capitol Drive.	4922-09	EWG TIP Fiscal Years 2018-2021
	Bridge improvements on I-70 at Sonderen Street and Executive Center Parkway.	N/A	MoDOT St. Charles County Major Construction Projects 2018-19
	City-wide repair and replacement of concrete streets. Project will also include installation of Americans with Disabilities Act (ADA) compliant accessible ramps at existing sidewalks along streets where	2015/16-2020/21	City of St. Peters Capital Improvement Plan (CIP) Fiscal Years: 2015/16 - 2020/21

Table 4-1: Projects Included in the No-Action Alternative

Applicable I-70 PEL Study Segment	Project Description	Agency Job Number (If Applicable)	Source
	curb replacement operations are planned.		
	Lane restriping, interchange improvements, and construction of outer roads and sidewalks along I-70 from Woodlawn Avenue to TR Hughes Boulevard.	5537-12 / 6I2418	MoDOT 2018 -2022 STIP
2,3	Pavement rehabilitation, interchange improvements, and additional lanes on I-70 from SH 94 to SH 370.	N/A	EWG Long Range Transportation Plan (LRTP)
2,3,4	Pavement improvements along I-70 from Fifth Street in St. Charles County to Fee Fee Road in St. Louis County.	5969A-16 / 6I3109	MoDOT 2018 -2022 STIP
3	Bridge improvements on St. Charles Rock Road at I-70.	6811B-18 / 6S3311	MoDOT 2018 -2022 STIP
	Bridge rehabilitation on eastbound Blanchette Bridge over Missouri River	6788K-18 / 6I3225	EWG TIP Fiscal Years 2019 - 2022
	Earth City Access Improvements	N/A	St Louis Regional Freightway - 2019 Priority Freight Project
3,4	Bridge improvements on I-70 at Route 141 underpass and McKelvey Road overpass.	6798A-17 / 6I3251	MoDOT 2018 -2022 STIP
	Pavement improvements at I-70/180 interchange.	6705D-17 / 6I3166	MoDOT 2018 -2022 STIP
	Bridge painting on I-70 at the Route 141/Earth City Expressway underpass and McKelvey overpass.	N/A	MoDOT North St. Louis County Major Construction Projects 2018-19
	Pavement replacement on southbound I-270 exit ramp to the I-70 split.	N/A	MoDOT North St. Louis County Major Construction Projects 2018-19
	2018 Arterial Road System Improvement Program (Area A and Area B)	N/A	St. Louis County 5-year Capital Plan
	2018-2022 Collector Road System Replacement/Mill and Overlay Program	N/A	St. Louis County 5-year Capital Plan
	2018-2022 Collector Road System Overlay Program	N/A	St. Louis County 5-year Capital Plan
	2018-2022 Collector Road System Pavement Improvement Program	N/A	St. Louis County 5-year Capital Plan
	2018 Arterial Road System Pavement Improvement Program	N/A	St. Louis County 5-year Capital Plan
	2018-2022 Complete Trail Connections Program	N/A	St. Louis County 5-year Capital Plan
	2018-2022 Complete Transit Connections Program	N/A	St. Louis County 5-year Capital Plan
	2018-2022 Transportation Alternatives Program Projects	N/A	St. Louis County 5-year Capital Plan
	2018-2022 ADA Improvements Program	N/A	St. Louis County 5-year Capital Plan
	2019-24 TIP Anticipated Federal Projects for Arterial Roadway System	N/A	St. Louis County 5-year Capital Plan

Table 4-1: Projects Included in the No-Action Alternative

Applicable I-70 PEL Study Segment	Project Description	Agency Job Number (If Applicable)	Source
4	2019-24 TIP Anticipated Federal Projects for Collector Roadway System	N/A	St. Louis County 5-year Capital Plan
	2019-24 TIP Anticipated Federal Projects for Arterial Roadway System Bridges	N/A	St. Louis County 5-year Capital Plan
	2019-24 TIP Anticipated Federal Projects for Collector Roadway System Bridges	N/A	St. Louis County 5-year Capital Plan
	2019-24 TIP Anticipated Federal Projects-ITS	N/A	St. Louis County 5-year Capital Plan
4.5	Bridge improvements at McDonnell Boulevard and Lambert International Boulevard ramp to I-70 eastbound.	6811S-18 / 6I3326	MoDOT 2018 -2022 STIP
	St. Charles Rock Road Resurfacing and ADA updates from Taussig Road west to Missouri Route 141 (Earth City Expressway).	1477	St. Louis County 5-year Capital Plan
	North Hanley Road (A) Resurfacing	1482	St. Louis County 5-year Capital Plan
	Hanley Road (A) Resurfacing	1716	St. Louis County 5-year Capital Plan
	NorthPark Access Improvements	N/A	St Louis Regional Freightway - 2019 Priority Freight Project
5	Pavement improvements on I-70 from Springdale Avenue in Berkeley to Union Boulevard in City of St. Louis.	6705C-17 / 6I3165	MoDOT 2018 -2022 STIP
	Bridge improvements to 10 bridges on I-70 from Jennings Station Road to Coldwater Creek (Cypress Road).	6807U-18 / 6I3338	MoDOT 2018 -2022 STIP
	Pavement improvements on I-70 from west of Kingshighway Boulevard to west of Branch Street.	6807S-18 / 6I3257	MoDOT 2018 -2022 STIP
	Pedestrian bridge improvements over I-70 west of Madison Street.	6331C-17 / 6I3268	MoDOT 2018 -2022 STIP
	Asphalt pavement repair to various interstates in St. Charles County, St. Louis County and City of St. Louis.	6807P-18 / 0I3004M	EWG TIP Fiscal Years 2018-2021
	Pavement improvements along the Express Lanes from east of Union to Broadway	5969D-16 / 6I3112	EWG TIP Fiscal Years 2017-2020
	I-70/Hwy. U interchange improvements.	613156 / 6651Y-16	MoDOT 2018-2022 STIP EWG TIP Fiscal Years 2017-2020
	Interchange improvements at I-70 westbound exit ramp to Broadway and along Broadway.	6630-16 / 6I3205	MoDOT 2018 -2022 STIP
	City-wide bridge resurfacing and repair of bridges that do not qualify for federal matching funds.	N/A	City of St. Louis 2018 CIP
	Arterial roadway resurfacing, including installation of ADA-compliant curb cuts as streets are repaired.	N/A	City of St. Louis 2018 CIP

Table 4-1: Projects Included in the No-Action Alternative

Applicable I-70 PEL Study Segment	Project Description	Agency Job Number (If Applicable)	Source
Not Location Specific	Bridge replacement over I-70 at Broadway	6798I-18 / 6S3272	EWG TIP Fiscal Years 2019 - 2022
	North Riverfront Commerce Corridor Improvements-Hall Street to Riverview Drive	N/A	St Louis Regional Freightway - 2019 Priority Freight Project
	Safety improvements at various locations.	5969-14 / 6P3067, 6691-19 / 0P3019G, 6692-20 / 0P3020G, 6693-21 / 0P3021G	EWG TIP Fiscal Years 2018-2021
	Region-wide preservation/operations.	N/A	EWG LRTP
Maintenance/ADA Compliance Projects (Transit)			
4	ADA Transition Plan improvements at I-70	6798D-17 / 6S3271	EWG TIP Fiscal Years 2019 - 2022
	Pavement and ADA Transition plan improvements.	5973-14 / 6S3048	EWG TIP Fiscal Years 2018-2021
4,5	Maintenance of existing transit system in St. Louis County and City of St. Louis.	N/A	EWG LRTP
Not Location Specific	Bus and paratransit preventative maintenance program.	N/A	EWG LRTP
Roadway Expansion/Upgrade Projects			
1	Capacity improvements on I-64 from Route K to I-70.	N/A	EWG LRTP
	Lake St. Louis Boulevard roundabout at Veterans Memorial Parkway and I-70 eastbound on/off ramps.	6822-19 / 6S3408	EWG TIP Fiscal Years 2018-2021
1,2	I-70 South Outer Road from Woodlawn Avenue to TR Hughes Boulevard/Belleau Creek Road. Currently under construction; includes a new one-way (eastbound) south outer road and conversion of the north outer road to a one-way (westbound).	CRB16-001	St. Charles County TIP 2017-2019
2	Proposed connector road to provide a two-way north/south connection between existing Veterans Memorial Parkway and upcoming new South Outer Road to be constructed as part of ongoing I-70 Outer Road project.	CRB16-013	St. Charles County TIP 2017-2019
	Convention Center Boulevard (Fairgrounds) Extension (St. Charles) from Sherbrooke Road to Convention Center parking lot entrance. Will provide direct access to I-70.	CRB16-004	St. Charles County TIP 2017-2019

Table 4-1: Projects Included in the No-Action Alternative

Applicable I-70 PEL Study Segment	Project Description	Agency Job Number (If Applicable)	Source
	North outer road bridge project to reconnect I-70 north outer road system between Salt Lick Road/Hwy. 79 and Mid Rivers Mall Drive.	CRB16-011	St. Charles County TIP 2017-2019
5	Relocate westbound off ramp to Carrie at northbound Broadway	6630-16 / 6I3205	EWG TIP Fiscal Years 2017-2020
Signage and Striping Projects			
2,3	Proposed program to install plowable high-visibility reflectors on major streets over three years.	420-500-501-873-111	City of St. Charles CIP 2018-2023
	Installation of light-emitting diode (LED) street name ID signs at signalized intersections throughout the City of St. Charles.	420-500-501-873-111	City of St. Charles CIP 2018-2023
	City-wide Manual on Uniform Traffic Control Devices (MUTCD) non-conforming signage replacement.	420-500-501-873-199	City of St. Charles CIP 2018-2023
Signal Optimization Projects			
1, 2	Signal optimization on Hwy. K at I-70.	6758F-19 / 6P3218 & 6758FF-18 / 6P3218	EWG TIP Fiscal Years 2018-2021
2	Flashing yellow arrow installation at 30 signalized intersections at various locations throughout O'Fallon.	6759-17	EWG TIP Fiscal Years 2018-2021
2,3	City-wide on-going replacement of traffic signal controller parts as part of preventative maintenance program along with any necessary repairs due to vehicular accidents, vandalism, or aging.	420-500-501-873-099	City of St. Charles CIP 2018-2023
	Flashing yellow arrow installation (Phase 2) at 15 signalized intersections at various locations throughout City of St. Charles.	6760-17	EWG TIP Fiscal Years 2018-2021
	Existing signal modifications to create flashing yellow arrow indication for left-turn movements at 10 city intersections and MoDOT-owned intersections to improve intersection traffic flow and safety.	410-500-501-873-111	City of St. Charles CIP 2018-2023
2,5	Signal optimization on Tucker Boulevard, Grand Avenue, TR Hughes Blvd, and Bryan Road at I-70.	6758E-18 / 6P3217 & 6758EE-18 / 6P3217	EWG TIP Fiscal Years 2018-2021

Table 4-1: Projects Included in the No-Action Alternative

Applicable I-70 PEL Study Segment	Project Description	Agency Job Number (If Applicable)	Source
4	Signal optimization on Route 115 interchanges including I-70	6758D-17 / 6P3222	MoDOT 2018 -2022 STIP
	Lambert Airport Rd traffic flow improvements	6763-17	EWG TIP Fiscal Years 2018-2021
5	Downtown Signal Optimization – Traffic Management Enhancements Phase 3	6631-16	EWG TIP Fiscal Years 2018-2021

N/A – Not applicable

Sources:

1. City of St. Charles Capital Improvement Plan 2018-2023.
2. City of St. Peters Capital Improvement Plan 2016/17-2021/22.
3. EWG Transportation Improvement Program FY (fiscal year) 2018-2021.
4. EWG Connected2045, *Long-Range Transportation Plan for the St. Louis Region*.
5. MoDOT Statewide Transportation Improvement Program 2018-2022.
6. MoDOT Major Projects 2018-2019 (MoDOT 2018c).
7. MoDOT St. Louis District Safety Project (MoDOT 2017g).
8. MoDOT St. Charles County Major Construction Projects 2018-19 (MoDOT 2018d).
9. St. Louis County 2018-2022 Capital Improvement Program.

4.2 Conceptual Strategies

The conceptual strategies for achieving the Study Corridor vision, Study Purpose and Need, and specific goals for each segment are listed in Table 4-2. These strategies represent a broad range of potential solutions identified through the public and stakeholder outreach program described in Chapter 3.0 and a technical assessment of the transportation needs in the Study Area.

Three strategies (TDM, ITS, and new technologies) were explored at the corridor level.

The conceptual strategies were generally explored at the segment level to identify and prioritize strategies that best meet the needs of each segment (see Section 4.3). Three strategies were explored at the corridor level, and include Transportation Demand Management (TDM), Intelligent Transportation Systems (ITS), and new technologies (all components of the Corridor Management/Technology Concept). Considerations and recommendations regarding how to plan for and implement these three strategies are not location-specific and warrant a corridor-wide approach. The recommendations for these strategies are found in Section 5.1.

Table 4-2: Conceptual Strategies

Conceptual Strategies	Applicable Segments						Elements of the Vision Supported by Concept	Elements of the P&N Supported by Concept	Transportation Goals Supported by Concept
	1	2	3	4	5	Corridor			
Corridor Management/ Technology Concept: This concept focuses on programs and technologies to maximize the efficiency of the interstate system within the Study Corridor. Strategies include Transportation System Management (TSM), Transportation Demand Management (TDM), Intelligent Transportation Systems (ITS), and infrastructure needs to allow for newer technologies. TSM measures include localized improvements, such as signal timing optimization, ramp metering, or signing/stripping improvements, that can be applied at various locations in each segment. TDM, ITS and technology infrastructure are explored at the corridor level. TDM measures include information, benefits, programs, incentives, and ordinances intended to reduce vehicle miles traveled (VMT) and peak-hour congestion. ITS measures include communications technology that connects vehicles to each other and the road for the purpose of improving safety and system performance. ITS is part of the infrastructure needed to implement new technologies including connected vehicles (CV) and autonomous vehicles (AV). Other infrastructure needs for AV might include enhanced signs, road markings, traffic controls, and vehicle identification systems. Additionally, travel lane needs (width and recovery area) for AVs are different than requirements for human operated vehicles.						✓	<ul style="list-style-type: none"> Safety Reliable mobility for all users Modernizing and making smart to accommodate an array of new and emerging technologies, including CV and AV 	<ul style="list-style-type: none"> Increase safety Manage existing and future congestion Improve efficiency and reliability of freight movement 	<ul style="list-style-type: none"> Reduce potential for crashes, including crashes involving bicycles and pedestrians Ensure mainline and interchanges operate at current MoDOT LOS standard Improve efficiency of access to freight hubs
System Optimization Concept: This concept focuses on localized improvements to the existing interstate system (including collector/distributor roads) to improve safety and operations. In Segment 5, collector/distributor routes such as Bircher Boulevard and 11 th Street also function as residential collector streets, which warrants different considerations as to how those dual-purpose routes could function more efficiently and safely. This concept includes a wide variety of strategies, such as reducing or eliminating conflict points at interchanges, improving operations at interchanges, addressing weave sections, traffic calming measures on collector/distributor roads, or bringing interstate elements up to standards. These strategies could be achieved in a variety of ways, ranging from larger projects such as interchange reconfigurations or interchange consolidation, to smaller projects such as lengthening ramps and acceleration/deceleration lanes or eliminating tight curves.	✓	✓	✓	✓	✓		<ul style="list-style-type: none"> Safety Reliable mobility for all users Efficient access to businesses/employment centers/freight hubs Lessen the highway's impact on neighborhoods that pre-date the interstate Catalyst for economic development opportunities 	<ul style="list-style-type: none"> Increase safety Manage existing and future congestion Improve efficiency and reliability of freight movement Address substandard bridges and deficiencies in other physical assets 	<ul style="list-style-type: none"> Reduce potential for crashes, including crashes involving bicycles and pedestrians Improve configurations to address high crash locations Maintain/preserve physical conditions of infrastructure Ensure mainline and interchanges operate at current MoDOT LOS standard Improve efficiency of access to freight hubs Minimize/eliminate impediments to freight Provide/improve interstate connections serving current/future development/redevelopment areas Improve configurations to address high crash locations Improve access to Lambert Airport for passengers, employees, and freight/cargo
Mainline Capacity Concept: This concept focuses on alleviating congestion through mainline capacity improvements to the interstate. Strategies include adding general purpose lanes or managed lanes. Managed lanes could include tolled express lanes, high-occupancy vehicle (HOV) lanes, and high-occupancy toll (HOT) lanes. Options to optimize or repurpose Express Lanes will be evaluated in detail in a separate study.	✓	✓	✓	✓	✓		<ul style="list-style-type: none"> Reliable mobility for all users Efficient access to businesses/employment centers/freight hubs 	<ul style="list-style-type: none"> Manage existing and future congestion Improve efficiency and reliability of freight movement 	<ul style="list-style-type: none"> Ensure mainline and interchanges operate at current MoDOT LOS standard Improve efficiency of access to freight hubs Optimize the function of the existing Express Lanes area
Freight Concept: This concept focuses on addressing freight bottlenecks and improving efficiency of access to freight hubs. Strategies include upgrading infrastructure to better accommodate freight, implementing MoDOT and Freightway priority projects, and removing barriers to freight movement. Options to achieve these strategies might include raising substandard bridge heights, reconfiguring interchanges or access routes to freight hubs, or other improvements to address congestion.	✓	✓	✓	✓	✓		<ul style="list-style-type: none"> Reliable mobility for all users Efficient access to freight hubs 	<ul style="list-style-type: none"> Improve efficiency and reliability of freight movement 	<ul style="list-style-type: none"> Improve efficiency of access to freight hubs Minimize/eliminate impediments to freight movement along the Study Corridor Improve access to Lambert Airport for passengers, employees, and freight/cargo

Table 4-2: Conceptual Strategies

Conceptual Strategies	Applicable Segments						Elements of the Vision Supported by Concept	Elements of the P&N Supported by Concept	Transportation Goals Supported by Concept
	1	2	3	4	5	Corridor			
Transit Concept: This concept focuses on expanding and enhancing transit infrastructure and service to increase transit access and mode choice. Strategies include higher cost improvements such as commuter or light rail; moderate cost improvements such as BRT, bus only lanes, or larger capacity buses/trains; and lower cost improvements such as adding express routes, increasing service frequency, or implementing bus priority.	✓	✓	✓	✓	✓		<ul style="list-style-type: none"> Reliable mobility for all users Multi-modal transportation options Enhanced public transportation Catalyst for economic development opportunities Fostering vibrant communities 	<ul style="list-style-type: none"> Improve multi-modal mobility and connectivity 	<ul style="list-style-type: none"> Allow improved accessibility to public transportation Increase transportation options for households without access to vehicles Improve travel times between the City of St. Louis and suburban employment centers for households without access to vehicles
Local/Parallel Route Concept: This concept focuses on alleviating congestion on I-70 by making local/parallel routes more efficient for local trips; thereby removing local trips from the interstate. Strategies could include safety and capacity improvements and improving connectivity to the interstate and connectivity between parallel routes.	✓	✓	✓				<ul style="list-style-type: none"> Safety Reliable mobility for all users Connecting communities along the Study Corridor to the intra- and interstate roadway 	<ul style="list-style-type: none"> Increase safety Manage existing and future congestion 	<ul style="list-style-type: none"> Reduce congestion on parallel road system Provide/improve interstate connections serving current/future development/redevelopment areas
Bicycle and Pedestrian Concept: This concept focuses on expanding and enhancing bike/ped infrastructure to encourage active transportation and increase mode choice. Strategies include adding or improving bike/ped facilities crossing I-70 and improving connections to the larger bike/ped network.	✓	✓	✓	✓	✓		<ul style="list-style-type: none"> Safety Reliable mobility for all users Fostering vibrant communities Lessening the highway's impact on neighborhoods that pre-date the interstate 	<ul style="list-style-type: none"> Increase safety Improve multi-modal mobility and connectivity 	<ul style="list-style-type: none"> Reduce potential for crashes, including crashes involving bicycles and pedestrians Allow improved accessibility to public transportation Improve active transportation to major destinations and the local network Increase transportation options for households without access to vehicles

4.3 Prioritization of Conceptual Strategies

Strategies were prioritized based on how well they would address the goals of each segment, including the goal to address transportation needs and the goal to minimize impacts to the natural and built environment.

For each conceptual strategy listed above, the Study team identified how the strategy would logically be applied in the segment. For example, to apply the strategy of bringing the facility up to current standards, the Study team identified substandard components of the infrastructure system on I-70 in each segment. For some segments, this involved addressing substandard bridge heights, for others it involved addressing substandard curves. The assumptions for how a strategy would be applied in each segment were used to evaluate each strategy based on how well they achieved the goals for each segment.

In a series of workshops, the Study team evaluated and prioritized the conceptual strategies using the methodology described below. The results of this analysis are summarized in Table 4-3 through Table 4-7, and additional details are provided in Appendix D. The conceptual strategies are listed down the left side of the tables and the goals are listed across the top. The goals are grouped under two categories: those to improve the transportation system (shown in **green**) and those to minimize impacts to surrounding communities and natural resources (shown in **red**). While cost was not considered in the prioritization, order-of-magnitude cost estimates for each strategy, relative to the other strategies considered, are provided in the evaluation tables.

While cost was not considered in the prioritization, order-of-magnitude cost estimates for each strategy, relative to the other strategies considered, are provided in the prioritization tables.

Strategies were rated for each goal as follows:

- **Transportation Goals:** For each goal, a strategy was rated good, fair, or poor based on how well a strategy would collectively achieve the transportation goals, which was an indication of how much benefit would be gained from implementing the strategy with respect to addressing the transportation needs and the overall vision for the Study Corridor.
- **Impact Minimization Goals:** Strategies were rated good, fair, or poor for each goal based on the degree of impact likely associated with a strategy in a given segment. Strategies rated good or fair are more desirable than strategies rated poor. However, poorly rated strategies (i.e., strategies that would likely have high impacts) may still be worthy of consideration if they would provide a great deal of benefit in addressing transportation needs.

Table 4-3: Segment 1 Prioritization of Conceptual Strategies

Segment 1 Conceptual Strategies (Wentzville [Route Z] to Route K)	Alignment with Transportation Goals (Good, Fair, Poor)								Alignment with Impact Minimization Goals (Good, Fair, Poor)		
	Reduce potential for crashes (including crashes involving bike/ped)	Maintain/preserve physical conditions of infrastructure	Improve LOS on mainline and at interchanges	Reduce congestion on parallel road system	Improve efficiency of access to freight hubs	Minimize/eliminate impediments to freight movement along the corridor	Allow improved accessibility to public transportation	Improve active transportation access to major destinations and local network	Minimize impacts to natural environment	Minimize impacts to built environment	Minimize construction issues
High Priority Strategies											
Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects) Cost: \$\$	●	●	○	○	●	●	○	●	●	●	●
Add and/or improve bike/ped facilities crossing I-70; Improve bike/ped connections to the larger bike/ped network Cost \$-\$\$	●	●	○	○	○	○	●	●	●	●	●
Improve local/parallel road system Cost: \$\$\$	●	●	●	●	●	○	○	●	●	●	●
Other Recommended Strategies											
Bring facility to current standards Cost: \$-\$\$\$\$	●	●	○	○	●	●	○	●	●	●	●
Address weave sections Cost: \$\$	●	●	●	○	○	●	○	○	●	●	●
Implement TSM measures Cost: \$	●	○	●	●	○	●	○	○	●	●	●
Low cost transit enhancements Cost: \$-\$\$	○	○	●	○	○	○	●	●	●	●	●
Improve operations of interchanges Cost: \$-\$\$\$\$	●	●	●	○	○	●	○	●	●	●	○
Reduce/eliminate conflict points at interchanges Cost: \$\$	●	●	●	○	○	●	○	●	●	●	○
Add mainline capacity Cost: \$\$\$	●	●	●	●	○	●	○	○	●	○	●
Long-Term Strategies for Future Consideration											
Moderate cost transit enhancements Cost: \$\$	○	○	●	○	○	○	●	●	●	●	●
High cost transit enhancements Cost: \$\$\$	○	○	●	○	○	○	●	●	●	○	○

Goal Rankings:

● Good

○ Fair

○ Poor

Order of magnitude costs: Low to high (\$ to \$\$\$)

Table 4-4: Segment 2 Prioritization of Conceptual Strategies

Segment 2 Conceptual Strategies (Route K to Highway 94)	Alignment with Transportation Goals (Good, Fair, Poor)								Alignment with Impact Minimization Goals (Good, Fair, Poor)		
	Reduce potential for crashes (including crashes involving bike/ped)	Maintain/ preserve physical conditions of infrastructure	Improve LOS on mainline and at interchanges	Reduce congestion on parallel road system	Improve efficiency of access to freight hubs	Minimize/ eliminate impediments to freight movement along the corridor	Allow improved accessibility to public transportation	Improve active transportation access to major destinations and local network	Provide/improve interstate con- nections serving current/ future development/ redevelopment areas	Minimize impacts to natural environment	Minimize impacts to built environment
High Priority Strategies											
Improve local/parallel road system Cost: \$\$\$	●	●	●	●	●	●	○	●	●	●	●
Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects) Cost: \$\$	●	●	○	○	●	●	○	●	○	●	●
Add and/or improve bike/ped facilities crossing I-70; Improve bike/ped connections to larger bike/ped network Cost: \$-\$	●	●	○	○	○	○	●	●	○	●	●
Reduce/eliminate conflict points at interchanges Cost: \$\$	●	●	●	○	●	●	○	●	●	●	○
Improve operations of interchanges Cost: \$-\$-\$	●	●	●	○	●	●	○	●	●	●	○
Other Recommended Strategies											
Low cost transit enhancements Cost: \$-\$	○	○	●	○	○	○	●	●	○	●	●
Implement TSM measures Cost: \$	●	○	●	●	○	●	○	○	○	●	●
Bring facility to current standards Cost: \$-\$-\$	●	●	○	○	●	●	○	●	○	●	●
Address weave sections Cost: \$\$	●	●	●	○	○	●	○	○	○	●	●
Add mainline capacity Cost: \$\$\$	●	●	●	●	○	●	○	○	○	○	●
Long-Term Strategies for Future Consideration											
Moderate cost transit enhancements Cost: \$\$	○	○	●	○	○	○	●	●	○	●	●
High cost transit enhancements Cost: \$\$\$	○	○	●	○	○	○	●	●	○	○	○
Add/improve interstate connections to state/local routes Cost: \$\$	●	●	●	●	○	○	○	●	●	●	○

Goal Rankings:

● Good

○ Fair

○ Poor

Order of magnitude costs: Low to high (\$ to \$\$\$)

Table 4-5: Segment 3 Prioritization of Conceptual Strategies

Segment 3 Conceptual Strategies (Highway 94 to I-270)	Alignment with Transportation Goals (Good, Fair, Poor)								Alignment with Impact Minimization Goals (Good, Fair, Poor)		
	Reduce potential for crashes (including crashes involving bike/ped)	Maintain/preserve physical conditions of infrastructure	Improve LOS on mainline and at interchanges	Reduce congestion on parallel road system	Improve efficiency of access to freight hubs	Minimize/eliminate impediments to freight movement along the corridor	Allow improved accessibility to public transportation	Improve active transportation access to major destinations and local network	Provide/improve interstate connections serving current/future development/redevelopment areas	Minimize impacts to natural environment	Minimize impacts to built environment
High Priority Strategies											
Improve local/parallel road system Cost: \$\$\$	●	●	●	●	●	●	○	●	●	●	●
Reduce/eliminate conflict points at interchanges Cost: \$\$	●	●	●	○	○	●	○	●	●	●	●
Add and/or improve bike/ped facilities crossing I-70; Improve bike/ped connections to larger bike/ped network Cost: \$-\$	●	●	○	○	○	○	●	●	○	●	●
Improve operations of interchanges Cost: \$\$-\$	●	●	●	○	○	●	○	●	●	○	●
Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects) Cost: \$\$	○	●	○	○	●	●	○	○	○	●	●
Other Recommended Strategies											
Low cost transit enhancements Cost: \$-\$	○	○	●	○	○	○	●	●	○	●	●
Implement TSM measures Cost: \$	●	○	●	●	○	●	○	○	○	●	●
Add mainline capacity Cost: \$\$	●	●	●	●	○	●	○	○	○	○	●
Address weave sections Cost: \$\$	●	●	●	○	○	●	○	○	○	●	●
Long-Term Strategies for Future Consideration											
Moderate cost transit enhancements Cost: \$\$	○	○	●	○	○	○	●	●	○	●	●
High cost transit enhancements Cost: \$\$\$	○	○	●	○	○	○	●	●	○	○	○

Goal Rankings:

● Good

○ Fair

○ Poor

Order of magnitude costs: Low to high (\$ to \$\$\$)

Table 4-6: Segment 4 Prioritization of Conceptual Strategies

Segment 4 Conceptual Strategies (I-270 to Florissant Road)	Alignment with Transportation Goals (Good, Fair, Poor)									Alignment with Impact Minimization Goals (Good, Fair, Poor)		
	Reduce potential for crashes (including crashes involving bike/ped)	Improve configurations to address high crash locations	Maintain/preserve physical conditions of infrastructure	Improve LOS on mainline and at interchanges	Improve efficiency of access to freight hubs	Minimize/eliminate impediments to freight movement along the corridor	Improve access to Lambert Airport for passengers, employees, freight/cargo	Allow improved accessibility to public transportation	Improve active transportation access to major destinations and local network	Provide/improve interstate connections serving current/ future development/redevelopment areas	Minimize impacts to natural environment	Minimize impacts to built environment
High Priority Strategies												
Add and/or improve bike/ped facilities crossing I-70: Improve bike/ped connections to larger bike/ped network and airport Cost: \$\$\$	●	●	●	○	○	○	●	●	○	●	●	●
Reduce/eliminate conflict points at interchanges Cost: \$\$	●	●	●	●	○	●	●	○	●	●	●	●
Bring facility to current standards (address substandard curves, narrow shoulders, etc.) Cost: \$\$-\$\$\$	●	●	●	●	●	●	●	○	●	○	●	●
Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects) Cost: \$\$	●	●	●	○	●	●	●	○	●	●	●	●
Consolidate and improve access points at airport and throughout segment Cost: \$\$-\$\$\$	●	●	●	●	○	●	●	○	●	●	●	●
Other Recommended Strategies												
Improve freight access to the airport Cost: \$\$	●	●	○	●	●	●	●	○	●	●	●	○
Address weave sections Cost: \$\$	●	●	●	●	○	●	●	○	○	●	●	●
Improve wayfinding at the airport Cost: \$	●	●	○	●	○	○	●	○	●	○	●	●
Improve operations of interchanges Cost: \$\$-\$\$\$	●	●	●	●	○	●	●	○	●	●	●	○
Low cost transit enhancements Cost: \$\$-\$	○	○	○	●	○	○	●	●	●	○	●	●
Implement TSM measures Cost: \$	●	●	○	●	○	●	●	○	○	●	●	●
Long-Term Strategies for Future Consideration												
Add mainline capacity Cost: \$\$\$	●	●	●	●	○	●	●	○	○	○	○	●
Moderate cost transit enhancements Cost: \$\$	○	○	○	●	○	○	●	●	○	●	●	●

Goal Rankings:

● Good

○ Fair

○ Poor

Order of magnitude costs: Low to high (\$ to \$\$\$)

Table 4-7: Segment 5 Prioritization of Conceptual Strategies

Segment 5 Conceptual Strategies (Florissant Road to North Broadway)	Alignment with Transportation Goals (Good, Fair, Poor/Not Relevant)											Alignment with Impact Minimization Goals (Good, Fair, Poor)		
	Reduce potential for crashes (incl. crashes involving bike/ped)	Improve configurations to address high crash locations	Maintain/preserve physical conditions of infrastructure	Improve LOS on mainline and at interchanges	*Optimize function of existing Express Lanes	Improve efficiency of access to freight hubs	Minimize/eliminate impediments to freight movement along the corridor	Allow improved accessibility to public transportation	Increase transportation options for households without access to vehicles	Improve travel times between City of St. Louis and suburban employment centers for households without access to vehicles	Improve active transportation access to major destinations and local network	Provide/improve interstate connections serving current/future development/redevelopment	Minimize impacts to natural environment	Minimize impacts to built environment
High Priority Strategies														
Add and/or improve bike/ped facilities crossing I-70; Improve bike/ped connections to larger bike/ped network Cost: \$-\$	●	●	●	○	○	○	●	●	●	●	○	●	●	●
Consolidate and improve access points Cost: \$\$-\$-\$	●	●	●	●	○	●	●	○	○	●	●	●	○	●
Improve operations of interchanges/ provide full access interchanges Cost: \$\$-\$-\$	●	●	●	●	○	●	●	○	○	●	●	●	●	○
Reduce/eliminate conflict points at interchanges Cost: \$\$	●	●	●	●	○	●	●	○	○	●	●	●	○	●
Bring facility to current standards Cost: \$\$-\$-\$	●	●	●	●	○	●	●	○	○	●	●	●	○	●
Other Recommended Strategies														
Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects) Cost: \$\$	●	●	●	○	○	●	●	○	○	●	○	●	●	○
Low cost transit enhancements Cost: \$-\$	○	○	○	●	○	○	○	●	●	●	○	●	●	●
Moderate cost transit enhancements Cost: \$\$	○	○	○	●	○	○	○	●	●	●	○	●	●	●

Table 4-7: Segment 5 Prioritization of Conceptual Strategies

Segment 5 Conceptual Strategies (Florissant Road to North Broadway)	Alignment with Transportation Goals (Good, Fair, Poor/Not Relevant)											Alignment with Impact Minimization Goals (Good, Fair, Poor)			
	Reduce potential for crashes (incl. crashes involving bike/ped)	Improve configurations to address high crash locations	Maintain/preserve physical conditions of infrastructure	Improve LOS on mainline and at interchanges	*Optimize function of existing Express Lanes	Improve efficiency of access to freight hubs	Minimize/eliminate impediments to freight movement along the corridor	Allow improved accessibility to public transportation	Increase transportation options for households without access to vehicles	Improve travel times between City of St. Louis and suburban employment centers for households without access to vehicles	Improve active transportation access to major destinations and local network	Provide/improve interstate connections serving current/future development/redevelopment areas	Minimize impacts to natural environment	Minimize impacts to built environment	Minimize construction issues
Implement TSM measures Cost: \$	●	●	○	●	○	●	●	○	○	○	○	○	●	●	●
Improve safety and function of collector/distributor roads: Cost: \$-\$\$	●	●	●	○	○	○	○	●	○	○	●	●	●	●	●
Address weave sections Cost: \$\$	●	●	●	●	○	●	●	○	○	○	○	○	●	●	●
Long-Term Strategies for Future Consideration															
Add mainline capacity Cost: \$\$\$	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○

* Options to optimize or repurpose Express Lanes will be evaluated in detail in a separate study.

Goal Rankings: ● Good

● Fair

○ Poor

Order of magnitude costs: Low to high (\$ to \$\$\$)

Strategies were prioritized into three categories. No strategies were screened out; all were considered potentially feasible solutions.

Based on their performance in addressing the collective goals of each segment, the conceptual strategies were prioritized into the three categories listed below. Because only strategies that met the Purpose and Need at a basic level were considered in this PEL Study, no strategies were eliminated or screened out; all were considered potentially feasible solutions.

- **High Priority Strategies:** These are strategies that would do the best job overall of addressing the goals in each segment. These strategies were explored further in this PEL Study to identify and evaluate improvement options in each segment (see Section 5.2).
- **Other Recommended Strategies:** These strategies would do a reasonably good job of addressing the goals in each segment, but would either offer less benefit than the high-priority strategies or would have considerably higher potential for impacts. While they are not discussed in Chapters 5.0 and 6.0 of this PEL Study, they are recommended for further consideration. More information on the other recommended strategies in each segment is provided in Appendix E.
- **Long-Term Strategies for Future Consideration:** These strategies would address some of the goals in each segment and may be beneficial for future consideration, but were not explored further in this PEL Study.

4.3.1 Summary of High Priority Conceptual Strategies

The strategies rated the highest in this Study, as summarized in Table 4-8, correlated well to the transportation issues identified in each segment. These strategies were rated highly because they would do the best job of addressing the most goals and were not anticipated to have substantial impacts to adjacent communities, the natural environment, or the traveling public.

Table 4-8: High-Priority Strategies

High-Priority Strategy	Segment				
	1	2	3	4	5
Bring facility to current standards				✓	✓
Upgrade infrastructure to better accommodate freight	✓	✓	✓	✓	✓
Improve local/parallel road system	✓	✓	✓		
Reduce/eliminate conflict points at interchanges	✓	✓	✓	✓	✓
Improve interchange operations	✓	✓			
Improve operations of interchanges/ provide full access interchanges					✓
Consolidate and improve access points					✓
Consolidate and improve access points at airport and throughout segment				✓	
Add/improve bicycle and pedestrian facilities	✓	✓	✓	✓	✓

Highlights of the prioritization results are noted below.

- In the western half of the Study Corridor, the interstate serves a higher number of local trips in proportion to the overall traffic volumes, as compared with other segments, and essentially functions as a collector-distributor road for many local trips. Improvements to the parallel road system in Segments 1, 2, and 3 would help remove this local traffic from the interstate, helping to address peak-hour congestion on I-70.
- In the eastern-most segments, interchange spacing along I-70 is inadequate and impacts traffic flow on the interstate. Consolidating and/or improving access points in Segments 4 and 5 would help to address safety issues and peak-hour congestion.
- Traffic maneuvers at interchanges and interstate access points result in substantial safety and congestion issues in the Study Corridor. Four out of the five Study segments include at least one high-priority strategy focused on improving interchanges, which includes reducing or eliminating conflict points at interchanges and improving interchange operations.
- Movement of freight is a key function of the I-70 Study Corridor, especially from Lambert Airport to the west. Consequently, Segments 1 through 4 prioritize the strategy to reduce impediments to freight movement and improve efficiency of access to freight hubs. This strategy would also serve other goals related to safety, congestion, and preserving/maintaining the physical conditions of infrastructure on I-70.
- Bicycle and pedestrian improvements were among the highest rated strategies in all segments because of their potential to improve safety and multi-modal mobility and connectivity, and because they would generally be low-impact strategies to implement.

5.0 Study Recommendations

In collaboration with the TAG and the SAG, the Study team developed recommendations to achieve the long-term vision for the I-70 Study Corridor. Study recommendations were grouped into the three categories listed below and are described in the following sections:

Study recommendations are grouped into three categories:

- Corridor-wide recommendations
- Segment-level recommendations
- Evaluation criteria for future projects

1. **Corridor-wide recommendations:** These recommendations focus on implementing the Corridor Management/Technology Concept (described in Table 4-2) throughout the Study Area, specifically transportation demand management (TDM), Intelligent Transportation Systems (ITS), and emerging technologies such as connected vehicles (CVs) and autonomous vehicles (AVs).
2. **Segment-level recommendations:** Based on the results of the prioritization presented in Chapter 4.0, improvement options were identified for each high-priority strategy to illustrate how the high-priority strategies in each segment might be applied. Other recommended strategies in each segment were explored further and are summarized in Appendix E. The long-term strategies, while potentially viable solutions, are not discussed further in this report.
3. **Evaluation criteria for future projects:** To supplement the general recommendations for Study Area improvements, a series of questions was developed to assess how well future project proposals align with the long-term vision established for the I-70 Study Corridor.

5.1 Corridor-Wide Recommendations

TDM, ITS, and new and emerging technologies were explored at the corridor level.

Three components of the Corridor Management/Technology Concept were explored at the corridor level, including TDM, ITS, and new and emerging technologies. Because considerations and recommendations for planning and implementing these strategies were not location-specific, a corridor-wide approach was warranted. These recommendations are summarized below and detailed in Appendix E.

5.1.1 Transportation Demand Management (TDM)

TDM refers to strategies that improve transportation system efficiency through low-cost, high-efficiency transportation solutions, such as carpooling, vanpooling, transit, bicycling, and walking. Strategies also include employer-based incentive programs, such as alternative work schedules that shift travel demand from peak travel times, and teleworking that reduces or eliminates the need for trips. In addition to improving travel reliability, TDM strategies can also extend the useful life of a transportation facility, reduce fuel consumption, and improve air quality.

This section summarizes TDM measures that are currently employed in Missouri and the St. Louis region, and recommends additional measures to implement in the Study Area to help meet the Purpose and Need of this Study. For details, please refer to the *Travel Demand Management (TDM) Technical Memorandum* (TDM Tech Memo) in Appendix E.

Several TDM strategies are currently in place within the Study Area.

Existing TDM Strategies

TDM strategies that are currently in place at the state and local level within the Study Area include:

- **RideFinders carpooling and vanpooling services:** Provides free carpool and vanpool ride matching service provided for the St. Louis region.
- **Commuter parking lots:** Provides convenient parking for commuter use and to encourage alternate commuting options.
- **Project real-time and traveler information:** Provides real-time images and road and traffic conditions to travelers via a website and on dynamic message boards along roadways, allowing drivers to consider alternate transportation modes, routes, and/or travel times based on current conditions.
- **Bike-share program:** Provides bicycles for riders to share in St. Louis City as well as St. Louis County.
- **St. Louis County road diet policy:** Reduces the number of travel lanes to accommodate turn lanes, alternate transportation modes, or on-street parking, typically through modified pavement markings.
- **EWG congestion management process and policies:** Implements policies to integrate congestion management in planning and programming to reduce congestion, improve reliability, and increase multi-modal transportation use in the St. Louis region
- **Reduced transit fares program:** Provides discounted transit fares to eligible riders to encourage transit use.
- **Safe Trek:** A smartphone application for emergency transit rider use while commuting, waiting for transit, or walking to a bus stop or station, intended to increase ridership by helping riders feel safer.

TDM Recommendations

Table 5-1 presents TDM strategies that are recommended for implementation in addition to those currently in use to improve I-70 operations without requiring additional construction.

Table 5-1: Recommended TDM Strategies Study Area by Segment

TDM Strategy*	Segment				
	1	2	3	4	5
Parking Restrictions: Limits available public parking to reduce the number of vehicles in a specific area or corridor. <u>Notes:</u> Effective in reducing single-occupancy vehicle (SOV) trips into high-density employment centers. Would require City of St. Louis to change parking ordinances.					●
Trip Reduction Ordinances: Requires developers, employers, and transportation organizations to implement TDM techniques to reduce trips. <u>Notes:</u> Would require city and/or county acceptance and ordinance changes.				●	●
HOV Lane: Reserves special lane for carpools, vanpools, and buses to encourage use of those modes and reduce SOV trips. <u>Notes:</u> May be unpopular with SOV travelers if a general purpose lane is converted to an HOV lane.	●	●	●	●	●
HOT Lane: Is similar to HOV lane, but allows SOVs to pay a fee for use. <u>Notes:</u> Recommended for consideration if mainline capacity improvements are proposed. No current legislation in Missouri allows tolling.	●	●	●	●	●
Predictive Traveler Information: Provides real-time data to predict travel conditions and provide information to travelers pre-trip and en-route to reduce peak period trips and improve system efficiency by use of alternate routes.	●	●	●	●	●
Dynamic Ridesharing: Provides for travelers to use smart phones and social networks to arrange short-notice, one-time, shared rides, facilitating real-time carpooling to reduce vehicle trips. <u>Notes:</u> Equivalent to Uber/Lyft rideshare options.			●	●	●
Large Employer and Campus TDM: Encourages employee transit use and reduces SOV trips by offering transit passes, providing better pedestrian and bicycle access/storage, or providing on-demand shuttle services. <u>Notes:</u> Effective when main office/campus is in high-density employment centers such as downtown St. Louis.	●	●	●		
Flexible Work Arrangements: Offers alternate work hours (compressed work-week or flextime), telecommuting, or alternate work locations to reduce rush hour traffic or eliminate commute trips altogether.	●	●	●	●	●
Tolling and Dynamic Tolling: Requires drivers to be charged a fixed fee/toll to use a road, bridge, or tunnel, or variable fees on a fixed schedule in response to anticipated traffic conditions. Dynamic tolls change based on congestion levels in real-time traffic conditions. <u>Notes:</u> there is no current legislation in Missouri allowing tolling.			●	●	●
Zone Pricing: Requires drivers to pay a toll when entering a "zone" to encourage use of alternate travel modes and reduce congestion in a zone. <u>Notes:</u> Effective in reducing SOV trips into high-density employment centers. No current legislation allows tolling in Missouri.					●
Dynamically Priced Parking: Charges parking fees based on demand and availability to influence trip timing choice and parking facility or location choice to better balance parking supply and demand, reduce negative impacts of drivers searching for parking, or reduce traffic impacts during peak periods. <u>Notes:</u> Effective in reducing SOV trips into high-density employment centers. Would require City of St. Louis to upgrade all parking meters, which is a cost consideration.			●	●	

*Refer to the TDM Tech Memo in Appendix E for detailed definitions of these strategies.

5.1.2 Intelligent Transportation Systems (ITS) and New and Emerging Technologies

ITS, CV, and AV technologies can be used on I-70 to supplement, delay, or even eliminate the need for transportation infrastructure projects intended to address high crash locations, congestion, or freight bottlenecks. This section discusses current ITS infrastructure and emerging AV and CV technologies, and makes recommendations for implementing these technologies in the Study Area. For details, please refer to the *Intelligent Transportation Systems (ITS) and Autonomous and Connected Vehicle (AV/CV) Investment Strategies Technical Memorandum* (ITS/AV/CV Tech Memo) in Appendix E.

Intelligent Transportation Systems (ITS)

ITS uses advanced applications of electronics and communications, such as enhanced traveler information transmitted via personal devices and variable message signs, to improve traffic operations and increase roadway effectiveness. The installation and maintenance costs of an ITS program tend to be lower than traditional infrastructure improvements, such as adding lanes. MoDOT currently uses ITS along I-70 to help support incident management, monitor traffic conditions, and distribute traveler information using a fiber optic communications network, closed-circuit television (CCTV) cameras, (dynamic message signs (DMS)/variable message signs (VMS), microwave vehicle detection systems (MVDSs), and road weather information stations (RWIS).



Source: MoDOT's Gateway Guide (MoDOT 2017e)

MoDOT currently employs ITS applications along I-70.

Because CV and AV technologies are advancing and their deployment is imminent, transportation agencies have started outlining ways to accommodate these technologies.

Autonomous Vehicle (AV) and Connected Vehicle (CV) Technologies

CV technology involves a transceiver imbedded in a vehicle that transmits position and directional data to other vehicles in the area. Each CV detects other CVs through wireless communications even when visually obstructed. The onboard transceivers also communicate to a transportation agency's communications network, which allows vehicles to share local travel information with the agency and allows the agency to share broader travel information from the region. The goal of a CV program is to create a nationwide driving environment, with safety and mobility information exchanged in almost real-time, significantly reducing the number of avoidable crashes and providing more efficient route selection.

AV technology involves a vehicle that shifts some or all of the driving responsibilities from the human driver to a computer. This represents a complete evolution in the way a transportation system operates and is

anticipated to be a catalyst for long-term changes in engineering standards and traffic operations. Some autonomous features exist in today's vehicles, such as lane departure assistance and adaptive cruise control. Over the next few decades, vehicles will continue to incrementally gain autonomous features, changing the road's operational environment as human driving becomes less necessary and less common.

Because CV and AV technologies are continually advancing and their deployment is imminent, transportation agencies have started outlining ways to accommodate these technologies in the future. While it is challenging to plan for such a system today when specific standards and requirements of the future are unknown, many prerequisite investments for advanced ITS programs, CVs and AVs can be anticipated. MoDOT and EWG have already begun to identify relevant technology initiatives, and several area studies have been prepared that outline future deployment of CV and AV technologies in the St. Louis region.

ITS/AV/CV Recommendations

Table 5-2 summarizes recommendations for the near-, mid-, long-, and future-term for improving ITS and implementing new CV and AV technologies within the Study Area. These recommendations are consistent with those in current planning studies summarized in the ITS/AV/CV Tech Memo provided in Appendix E, and focus on measures to align with the Study Purpose and Need. Some recommendations refer to the Society of Automotive Engineers (SAE) Levels of Autonomy (1 through 5), which are defined in the ITS/AV/CV Tech Memo in Appendix E.

Table 5-2: Recommendations for Implementing ITS, CV, and AV Technologies

Timeframe and Anticipated Status of Technology*	Study Area Recommendations
<p>Near-Term (0 to 4 years): CV standards are being studied across the country as part of pilot project efforts; no standards or practices have been formally adopted. Except for prototypes, almost no AVs are present in the road environment.</p>	<ul style="list-style-type: none"> • Supplement ITS in strategic areas: <ul style="list-style-type: none"> ◦ Add CCTVs to fill gaps in coverage and add DMS to provide greater traveler information. ◦ Strategically integrate ITS systems in conjunction with infrastructure improvements. ◦ Invest in ongoing expansion of data transmission capabilities. • Invest in CV deployment prerequisites: <ul style="list-style-type: none"> ◦ Adopt FHWA ITS standards for CV interfaces. ◦ Update traffic management software to enable processing of CV data. ◦ Identify and plan for CV roadside unit mounting locations and backhaul communication links along I-70. ◦ Upgrade ITS equipment to National Transportation Communications for ITS Protocol (NTCIP) standards.

Table 5-2: Recommendations for Implementing ITS, CV, and AV Technologies

Timeframe and Anticipated Status of Technology*	Study Area Recommendations
Mid-Term (5 to 14 years): CV standards will have been formalized at the national level and a "road ready" solution will be present in a minimum capacity. Some AVs may be on the roads, but they are anticipated to be SAE Level 3 vehicles (minimum driving requirements done by the AV) at best.	<ul style="list-style-type: none"> ○ Consider using the existing Express Lanes in the City of St. Louis to test AV/CV.
Long-Term (15 to 25 years): CV standards are being maintained, incremental improvements are being offered for hardware or software solutions, and CV-enabled vehicles account for nearly all of the vehicle fleet. Most vehicles will be functioning at an SAE Level 3 (minimum driving requirements automated) and vehicles functioning at SAE Levels 4 and 5 (most to all driving requirements automated) are becoming a larger portion of the vehicle fleet (20+ percent).	<ul style="list-style-type: none"> ● Update signing, striping, and traffic control device standards ● Invest in CV-enabled roadside units in strategic areas. ● Implement AV-only lanes.
Future-Term (25 years and beyond): SAE Level 5 AVs (fully autonomous with no human intervention necessary) are widely used, and SAE Level 3 and 4 vehicles are slowly being phased out. Nearly all vehicles are equipped with CV-enabled transceivers to improve operational efficiency of the AV.	<ul style="list-style-type: none"> ● Implement advanced roadway guidance systems (ARGS), which communicate detailed mapping of roadway geometry, lane designations, wayfinding, and roadway conditions in real-time to AVs and CVs.

* Society of Automotive Engineers (SAE) levels are defined in the ITS/AV/CV Tech Memo in Appendix E.

High-priority strategies consist of a sampling of options to address each segment's goal to incrementally achieve the long-term vision for the I-70 Study Corridor, rather than provide a list of specific projects to implement.

5.2 Segment-Level Recommendations

This section discusses how the high-priority strategies could be applied in each of the five I-70 segments in the Study Area. For high-priority strategies, general types and locations of transportation improvements are presented for illustrative purposes. This information is not intended to provide a comprehensive inventory of projects or an implementation plan, but rather a sampling of options that would address the goals in each segment and incrementally move the Study Corridor toward the long-term vision established under this Study.

5.2.1 Segment 1 High Priority Strategies

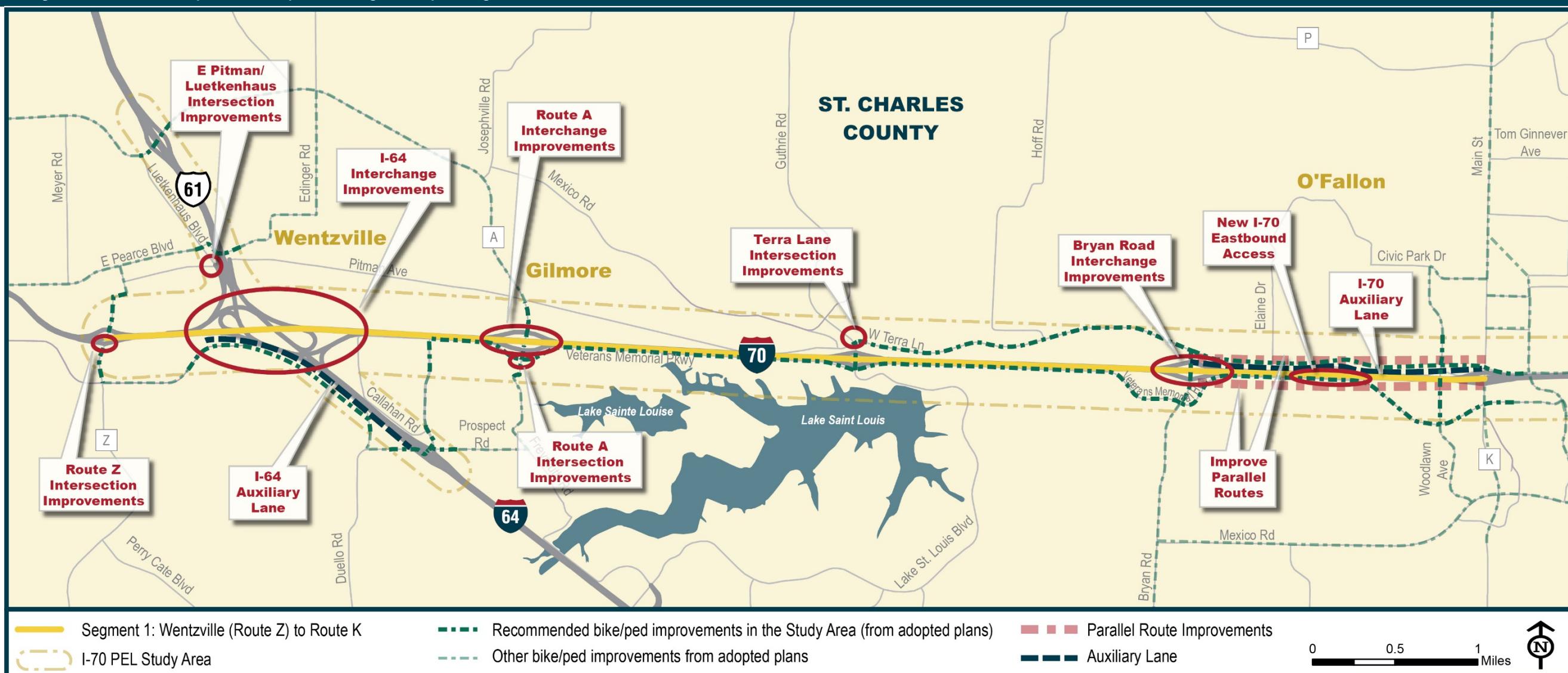
Improvement options for high-priority strategies in Segment 1 are discussed below and identified on Figure 5-1.

- Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects): Addressing congestion along I-70 through interchange and parallel route improvements would reduce existing impediments to freight movement in this segment. Raising bridge heights to current standards as part of the I-64 interchange improvements would better accommodate large commercial vehicles.
- Improve local/parallel road system: This strategy would help reduce traffic on I-70 by reducing the amount of local trips on I-70. This could be achieved by 1) improving intersection operations along parallel routes, as proposed at West Terra Lane and Lake St. Louis Boulevard; 2) identifying locations where access between I-70 and parallel routes should be provided, as proposed west of Woodlawn Avenue; and 3) making more extensive improvements along parallel routes, as proposed west of Bryan Road.
- Improve operations of interchanges and reduce/eliminate conflict points at interchanges: Based on current LOS and crash data, interchange reconfigurations or minor interchange improvements are recommended to improve LOS and safety in this segment. These strategies could be applied by 1) reconfiguring existing diamond interchanges to single-point urban interchanges or diverging diamond interchanges, 2) using roundabouts at ramp intersections instead of traffic signals, 3) adding auxiliary lanes, and/or 4) making minor ramp or turn-lane improvements.
- Add and/or improve bike/ped facilities crossing I-70; improve bike/ped connections to the larger bike/ped network: Recommended bicycle and pedestrian improvements include adding bike lanes, multi-use paths, and sidewalks in the Study Area consistent with the *Gateway Bike Plan* and *O'Fallon Connected: Highway K* (as shown on Figure 5-1 and listed in Table 5-3). MoDOT-funded projects in the Study Area will seek to include bicycle and pedestrian improvements consistent with adopted plans.

Table 5-3: Segment 1 Bicycle and Pedestrian Improvements

Roadway	From	To	Location	Action
Bike Lanes				
Wentzville Pkwy./Rte. A	Meyer Rd.	Veterans Memorial Pkwy.	Both sides	
Veterans Memorial Pkwy.	Corporate Pkwy.	Woodlawn Ave.		Add new facility
W. Terra Ln.	Lake St. Louis Blvd.	Bryan Rd.		Upgrade facility
W. Terra Ln.	Bryan Rd.	Rte. K		Add new facility
Woodlawn Ave.	Civic Park	Mexico Rd.		
Multi-Use Paths				
Church	4 th St.	Interstate Dr.	East side	
Lake St. Louis Blvd.	W. Terra Ln.	Veterans Memorial Pkwy.		
Bryan Rd.	W. Terra Ln.	Mexico Rd.		Add new facility
Rte. K	Pitman Ave.	Veterans Memorial Pkwy.	West side	
Sidewalks				
Lake St. Louis Blvd.	W. Terra Ln.	Veterans Memorial Pkwy.	West side	Add new facility
Bryan Rd.	I-70	Mexico Rd.	Both sides	Upgrade facility
Rte. K	Pitman Ave.	Veterans Memorial Pkwy.	West side	Add new facility

Note: While recommended bicycle and pedestrian improvements in this report focus on the I-70 Study Area, connectivity to existing and planned bicycle and pedestrian facilities is critical and should be considered during initiation and development of future projects. For informational purposes, the start and end points of bicycle and pedestrian improvements in this table include the entire segment recommended in adopted plans as sourced below. Source: Project team, *Gateway Bike Plan* (Green Rivers Greenway 2011) and *O'Fallon Connected: Highway K* (City of O'Fallon 2016).

Figure 5-1: Segment 1: Illustrative Improvement Options for High-Priority Strategies


Segment 1 - High Priority Strategies:		Route Z Intersection Improvements	E Pitman/Luetkenhaus Intersection Improvements	I-64 Interchange Improvements	I-64 Auxiliary Lane	Route A Interchange Improvements	Route A Intersection Improvements	Terra Lane Intersection Improvements	Bryan Road Interchange Option 1	Bryan Road Interchange Option 2	New I-70 Eastbound Access	I-70 Auxiliary Lane	Improve Parallel Routes
Action Description		Intersection Reconfiguration	Intersection Reconfiguration	Full Interchange Reconfiguration	Add Southbound Auxiliary Lane	Full Interchange Reconfiguration	Intersection Reconfiguration	Minor Intersection Reconfiguration	Option 1: Full Interchange Reconfiguration	Option 2: Minor Interchange Improvements	Add Interstate Access (Veterans Memorial Pkwy to I-70 EB)	Add Westbound Auxiliary Lane (Route K to Bryan Road)	Improve Parallel Routes (Bryan Road to Route K)
Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects)				✓	✓	✓			✓	✓	✓	✓	✓
Improve local/parallel road system		✓		✓		✓					✓		✓
Improve operations of interchanges		✓	✓	✓	✓	✓	✓		✓	✓		✓	
Reduce/eliminate conflict points at interchanges		✓	✓	✓		✓	✓		✓	✓			
Add and/or improve bike/ped facilities crossing I-70; Improve bike/ped connections to the larger bike/ped network		Recommended bicycle and pedestrian improvement locations displayed on map.											

5.2.2 Segment 2 High Priority Strategies

Improvement options for high-priority strategies in Segment 2 are discussed below and identified on Figure 5-2.

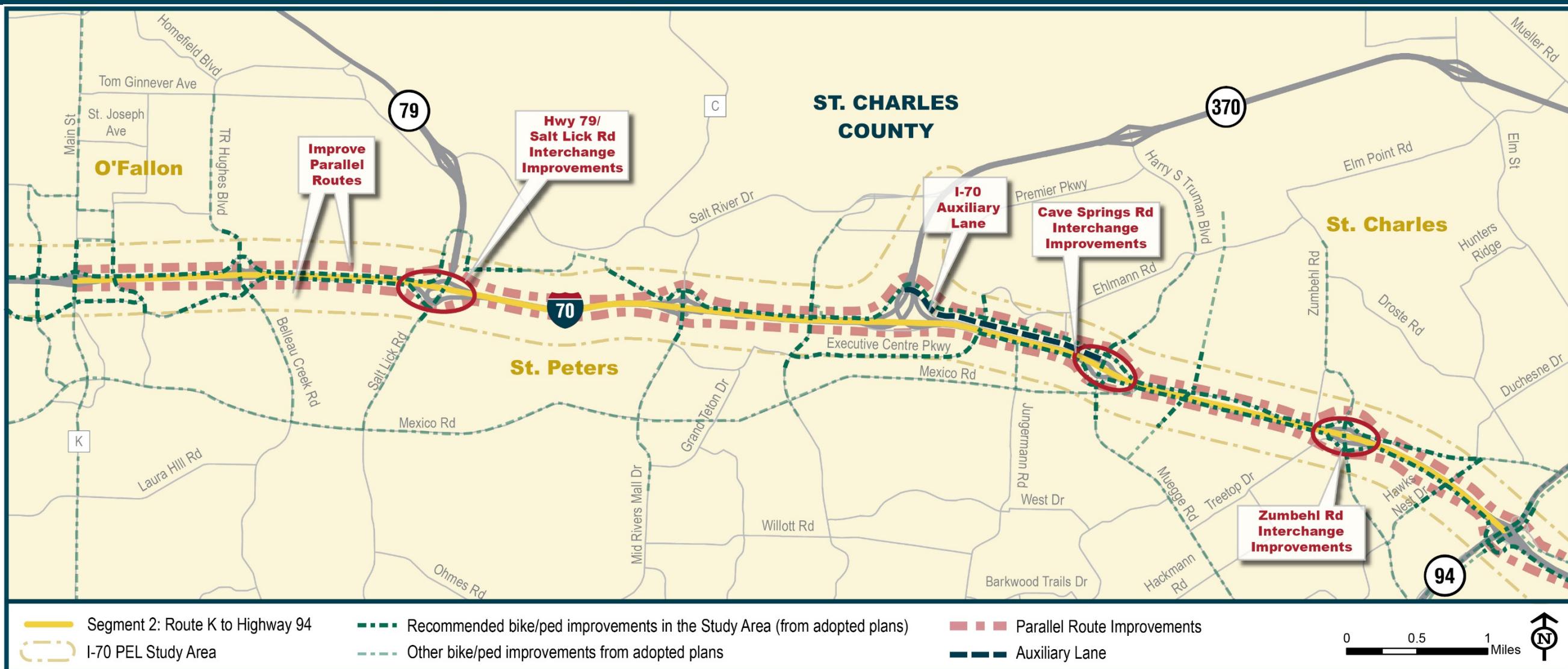
- **Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects):** Addressing congestion along I-70 through interchange and parallel route improvements would reduce existing impediments to freight movement in this segment and alleviate freight bottlenecks between Route K and Cave Springs Road. Raising bridge heights to current standards as part of the Hwy. 79/Salt Lick Road and Cave Springs Road interchange improvements would better accommodate large commercial vehicles.
- **Improve local/parallel road system:** This strategy would help reduce traffic on I-70 by reducing the amount of local trips on I-70. This could be achieved by 1) reconfiguring interchanges at Hwy. 79/Salt Lick Road and Cave Springs Road, and 2) making more extensive improvements along parallel routes as proposed throughout this segment.
- **Improve interchange operations and reduce/eliminate conflict points at interchanges:** Based on current LOS and crash data, interchange reconfigurations or minor interchange improvements are recommended to improve LOS and safety in this segment. These strategies could be applied by 1) reconfiguring existing diamond interchanges to single-point urban interchanges or diverging diamond interchanges, 2) using roundabouts at intersections instead of traffic signals, 3) adding auxiliary lanes, and 4) making minor ramp or turn lane improvements.
- **Add and/or improve bike/ped facilities crossing I-70; improve bike/ped connections to the larger bike/ped network:** Recommended bicycle and pedestrian improvements include adding bike lanes, multi-use paths, and sidewalks in the Study Area consistent with the *Gateway Bike Plan*, *City of St. Charles Bicycle and Pedestrian Master Plan*, and *O'Fallon Connected: Highway K* (as shown on Figure 5-2 and listed in Table 5-4). MoDOT-funded projects in the Study Area will seek to include bicycle and pedestrian improvements consistent with adopted plans.

Table 5-4: Segment 2 Bicycle and Pedestrian Improvements

Roadway	From	To	Location	Plan Document
Bike Lanes				
Veterans Memorial Pkwy.	Sonderen St.	Salt Lick Rd.	Both sides	Add new facility
TR Hughes/Belleau Creek	Tom Ginnever Ave.	Mexico Rd.		
E. Terra Ln.	Rte. K	Brown Rd.		
Spencer Rd.	Spencer Loop	Mexico Rd.		
Veterans Memorial Pkwy.	Executive Center Pkwy.	Fairgrounds		
Hawks Nest Dr.	W. Clay St.	Zumbehl Rd.		
Multi-Use Paths				
Veterans Memorial Pkwy.	Sonderen St.	Salt Lick Rd.	North side	Add new facility
Sonderen St.	Veterans Memorial Pkwy.	Wabash		
Salt Lick Rd.	E. Terra Ln.	Veterans Memorial Pkwy.	West side	
Mid Rivers Mall Dr.	Main St.	Mexico Rd.	North side	
W. Clay St.	Cave Springs Blvd.	Hwy. 94	East side	
Cave Springs Rd./Harry S. Truman Blvd.	Mexico Rd.	W. Clay St.	West side	
Zumbehl Rd.	W. Clay St.	Hwy. 94	N/A	
Trail undercrossing east of Zumbehl Rd.	Regency Pkwy.	W. Clay St.	Both sides	
Hwy. 94	W. Clay	Zumbehl Rd.	N/A	
Cutright Trl.	Cave Springs Blvd.	Ehlmann Rd.		
Sidewalks				
Zumbehl Rd.	W. Clay St.	Rte. 94	West side	Upgrade facility
Hawks Nest Dr.	W. Clay St.	Zumbehl Rd.	Both sides	
Rte. 94	W. Clay St.	Sherman Dr.		

Note: While recommended bicycle and pedestrian improvements in this report focus on the I-70 Study Area, connectivity to existing and planned bicycle and pedestrian facilities is critical and should be considered during initiation and development of future projects. For informational purposes, the start and end points of bicycle and pedestrian improvements in this table include the entire segment recommended in adopted plans as sourced below. Source: Project team, *Gateway Bike Plan* (Green Rivers Greenway 2011), *O'Fallon Connected: Highway K* (City of O'Fallon 2016), *City of St. Charles Bicycle and Pedestrian Master Plan* (City of St. Charles 2016). N/A – Not Applicable

Figure 5-2: Segment 2: Illustrative Improvement Options for High-Priority Strategies



Segment 2 - High Priority Strategies:		Improve Parallel Routes	Hwy 79/ Salt Lick Rd Interchange Option 1	Hwy 79/ Salt Lick Rd Interchange Option 2	I-70 WB Auxiliary Lane	Cave Springs Rd Interchange Improvements	Zumbuhl Rd Interchange Option 1	Zumbuhl Rd Interchange Option 2
Action Description		Improve Parallel Routes (TR Hughes Boulevard to 5th Street)	Option 1: Full Interchange Reconfiguration	Option 2: Minor Interchange Improvements	Add Eastbound and Westbound Auxiliary Lanes (Hwy 370 to Cave Springs Road)	Full Interchange Reconfiguration	Full Interchange Reconfiguration	Minor Interchange Improvements
Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects)		✓	✓		✓	✓	✓	✓
Improve local/parallel road system		✓	✓		✓	✓		
Improve operations of interchanges			✓	✓	✓	✓	✓	✓
Reduce/eliminate conflict points at interchanges			✓		✓	✓	✓	
Add and/or improve bike/ped facilities crossing I-70; Improve bike/ped connections to the larger bike/ped network		Recommended bicycle and pedestrian improvement locations displayed on map.						

5.2.3 Segment 3 High Priority Strategies

Improvement options for high-priority strategies in Segment 3 are discussed below and identified on Figure 5-3.

- Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects): Proposed interchange improvements at Hwy. 141 and I-270 would reduce existing impediments to freight movement in this segment and alleviate freight bottlenecks between Blanchette Bridge and I-270.
- Improve local/parallel road system: This strategy would help reduce traffic on I-70 by reducing the amount of local trips on I-70. This could be achieved by making improvements along parallel routes as proposed west of 5th Street.
- Improve operations of interchanges and reduce/eliminate conflict points at interchanges: Based on current LOS and crash data, interchange reconfigurations or minor interchange improvements are proposed to improve LOS and safety in this segment. These strategies could be applied by 1) reconfiguring existing clover-leaf interchanges to a more efficient design, 2) adding ramp capacity, or 3) adding slip ramps.
- Add and/or improve bike/ped facilities crossing I-70; improve bike/ped connections to the larger bike/ped network: Recommended bicycle and pedestrian improvements include adding shared lane markings, bike lanes, multi-use paths, and sidewalks in the Study Area consistent with the *Gateway Bike Plan* and *City of St. Charles Bicycle* (as shown on Figure 5-3 and listed in Table 5-5). MoDOT funded projects in the Study Area will seek to include bicycle and pedestrian improvements consistent with adopted plans.

Table 5-5: Segment 3 Bicycle and Pedestrian Improvements

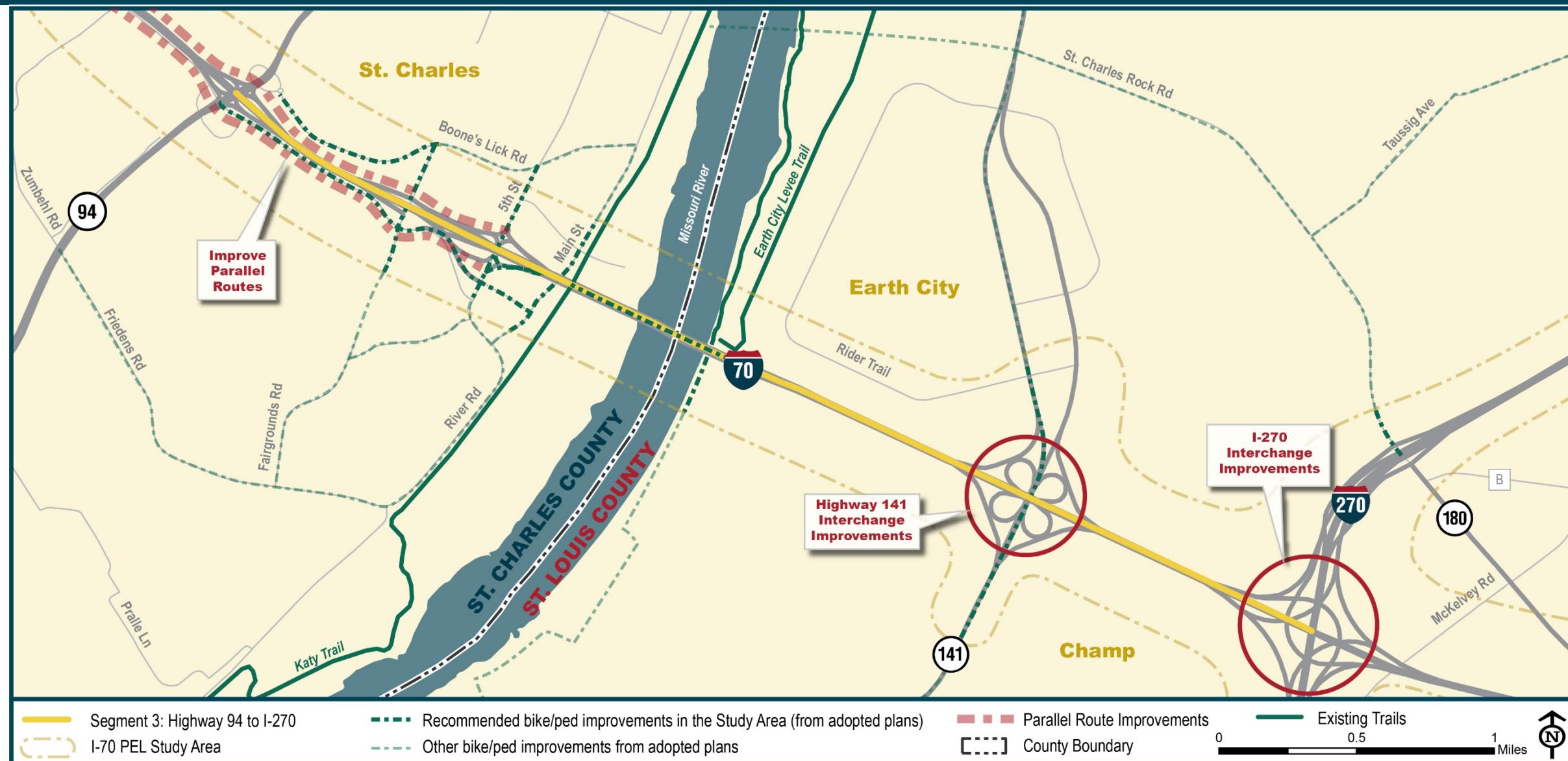
Roadway	From	To	Location	Action
Shared Lane Markings				
Boones Lick Rd.	5 th St.	Main St.	Both sides	Add new facility
Main St.	River Rd.	Boones Lick Rd.		
Bike Lanes				
Boones Lick Rd.	Rte. 94	5 th St.	Both sides	Add new facility
St. Charles Rock Rd.	Missouri Greenway	I-270		Upgrade facility
St. Charles Rock Rd.	I-270	McKelvey Rd.		Add new facility
Fairgrounds Rd.	Booneslick Rd.	Veterans Memorial Pkwy.		Upgrade facility
Multi-Use Paths				
Veterans Memorial Pkwy.	Fairgrounds Rd.	5 th St.	South side	Upgrade facility
5 th	Boones Lick Rd.	Lombard St.	Both sides	Add new facility
5 th /I-70	Lombard St.	Main St.	N/A	
River crossing near I-70	5 th St.	Missouri River Trail	TBD	
Fairgrounds Rd.	Freidens Rd.	Veterans Memorial Pkwy.	East side	
Rte. 141	St. Charles Rock Rd.	Riverport Dr.	West side	
Sidewalks				
5 th	Boones Lick Rd.	Lombard St.	Both sides	Upgrade facility
Fairgrounds Rd.	Freidens Rd.	Booneslick Rd.		

Note: While recommended bicycle and pedestrian improvements in this report focus on the I-70 Study Area, connectivity to existing and planned bicycle and pedestrian facilities is critical and should be considered during initiation and development of future projects. For informational purposes, the start and end points of bicycle and pedestrian improvements in this table include the entire segment recommended in adopted plans as sourced below.

Source: *Gateway Bike Plan* (Green Rivers Greenway 2011) and *City of St. Charles Bicycle and Pedestrian Master Plan* (City of St. Charles 2016).

N/A – Not Applicable

TBD – To Be Determined

Figure 5-3: Segment 3: Illustrative Improvement Options for High-Priority Strategies


Segment 3 - High Priority Strategies:		Improve Parallel Routes	Highway 141 Interchange Option 1	Highway 141 Interchange Option 2	I-270 Interchange Option 1	I-270 Interchange Option 2
Action Description		Improve Parallel Routes (TR Hughes Blvd to 5th Street)	Option 1: Full Interchange Reconfiguration	Option 2: Minor Interchange Improvements	Option 1: Partial Interchange Reconfiguration	Option 2: Minor Interchange Improvements
Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects)			✓	✓		
Improve local/parallel road system		✓				
Reduce/eliminate conflict points at interchanges			✓		✓	
Improve operations at interchanges			✓	✓	✓	✓
Add and/or improve bike/ped facilities crossing I-70; Improve bike/ped connections to the larger bike/ped network		Recommended bicycle and pedestrian improvement locations displayed on map.				

5.2.4 Segment 4 High Priority Strategies

Improvement options for high-priority strategies in Segment 4 are discussed below and identified on Figure 5-4.

- Bring the facility to current standards:¹ Figure 5-4 identifies the two areas where curve straightening is recommended to improve sight distance at substandard curves. Several bridges have a vertical clearance of less than 16 feet 6 inches, which is the current standard. At St. Charles Rock Road, Lindbergh Boulevard, Natural Bridge Road, and the I-70 ramp to I-170 eastbound, vertical clearances could be brought to current standards as part of the proposed interchange reconfigurations identified on Figure 5-4. Vertical clearances at Fee Fee Road and James S. McDonnell Boulevard could be brought to current standards when replacement of the bridges is warranted. However, raising the James S. McDonnel Boulevard bridge could conflict with Federal Aviation Administration standards. Non-standard left-side exits could be corrected at I-170 as part of reconfigurations recommended at that interchange.
- Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects): Addressing safety and congestion along I-70 through interchange improvements and curve straightening would reduce existing impediments to freight movement in this segment. Raising bridge heights to current standards as part of interchange and bridge improvements would better accommodate large commercial vehicles.
- Consolidate and improve access points at the airport and throughout the segment: Interchange improvements at Cypress Road and I-170 offer opportunities to improve and consolidate access points.
- Reduce/eliminate conflict points at interchanges: Based on current crash data, interchange reconfigurations or minor interchange improvements are proposed to improve safety. These strategies could be applied by 1) reconfiguring existing diamond interchanges to single-point urban interchanges, 2) lengthening acceleration lanes, or 3) adjusting ramps to allow more room for merging.
- Add and/or improve bike/ped facilities crossing I-70; improve bike/ped connections to the larger bike/ped network: Recommended bicycle and pedestrian improvements include adding shared lane markings, bike lanes, multi-use paths, and sidewalks in the Study Area consistent with the *Gateway Bike Plan* and the *Four Communities Bikeable Walkable Plan* (as shown on Figure 5-4 and listed

¹ While future projects will seek to bring infrastructure to standards, this may not always be practicable. Design variances will be considered during project development on a case by case basis.

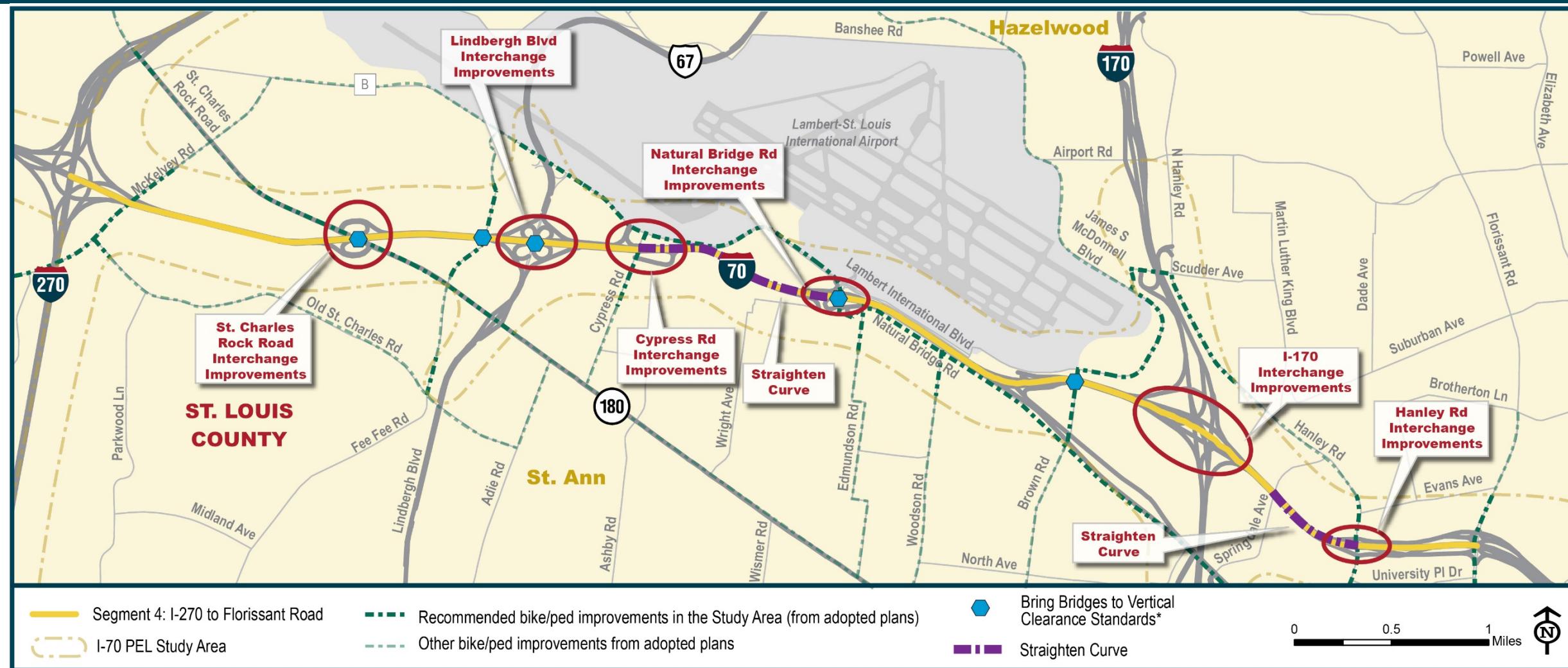
in Table 5-6). MoDOT-funded projects in the Study Area will seek to include bicycle and pedestrian improvements consistent with adopted plans.

Table 5-6: Segment 4 Bicycle and Pedestrian Improvements

Roadway	From	To	Location	Action
Shared Lane Markings				
Fee Fee Rd.	St. Charles Rock Rd.	Natural Bridge Rd. (Rte. B)	Both sides	Add new facility
Bike Lanes				
St. Charles Rock Rd.	Woodson Rd.	McKelvey Rd.	Both sides	Add new facility
McKelvey Rd.	I-270	Natural Bridge Rd. (Rte. B)		Upgrade facility
Natural Bridge Rd. (Rte. B)	McKelvey Rd.	Cypress Rd.		
Natural Bridge Rd. (Rte. B)	Air Flight Dr.	Brown Rd.		Add new facility
Brown Rd.	Natural Bridge Rd. (Rte. B)	James S. McDonnell Blvd.		
Woodson Rd.	Natural Bridge Rd. (Rte. B)	St. Charles Rock Rd.		Upgrade facility
Multi-Use Paths				
Natural Bridge Rd. (Rte. B)	Cypress Rd.	Air Flight Dr.	South side	Add new facility
Air Flight Dr.	Natural Bridge Rd. (Rte. B)	Natural Bridge Rd. (Rte. B)	West side	
N. Hanley Rd.	Natural Bridge Rd. (Rte. B)	Scudder Ave.	East side	
Sidewalks				
McKelvey Rd.	I-270	Natural Bridge Rd. (Rte. B)	Both sides	Add new facility
St. Charles Rock Rd.	Woodson Rd.	McKelvey Rd.		
Air Flight Dr.	Airport Rd.	Natural Bridge Rd. (Rte. B)		
Natural Bridge Rd. (Rte. B)	Air Flight Dr.	Brown Rd.	South side	Upgrade facility
Woodson Rd.	Natural Bridge Rd. (Rte. B)	St. Charles Rock Rd.	Both sides	
N. Hanley Rd.	Natural Bridge Rd. (Rte. B)	Scudder Ave.	West side	

Note: While recommended bicycle and pedestrian improvements in this report focus on the I-70 Study Area, connectivity to existing and planned bicycle and pedestrian facilities is critical and should be considered during initiation and development of future projects. For informational purposes, the start and end points of bicycle and pedestrian improvements in this table include the entire segment recommended in adopted plans as sourced below.

Source: Project team, *Gateway Bike Plan* (Green Rivers Greenway 2011), *Four Communities Bikeable Walkable Plan* (cities of Edmundson, Overland, St. John, and Woodson Terrace, 2016)

Figure 5-4: Segment 4: Illustrative Improvement Options for High-Priority Strategies


Segment 4 - High Priority Strategies:		St Charles Rock Rd Interchange Improvements	Bridge Improvements	Lindbergh Blvd Interchange Option 1	Lindbergh Blvd Interchange Option 2	Cypress Road Interchange Improvements	Straighten Curve	Natural Bridge Rd Interchange Option 1	Natural Bridge Rd Interchange Option 2	I-170 Interchange Option 1	I-170 Interchange Option 2	Straighten Curve	Hanley Rd Interchange Option 1	Hanley Rd Interchange Option 2
Action Description														
Bring facility to current standards*	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓		
Upgrade infrastructure to better accommodate freight (including implementation of MoDOT and Freightway priority projects)		✓	✓				✓		✓	✓	✓	✓	✓	✓
Consolidate and improve access points at airport and throughout segment					✓				✓	✓	✓	✓		
Reduce/eliminate conflict points at interchanges						✓						✓		
Add and/or improve bike/ped facilities crossing I-70; Improve bike/ped connections to the larger bike/ped network														

Recommended bicycle and pedestrian improvement locations displayed on map.

* While future projects will seek to bring infrastructure to standards, this may not always be practicable.

Design variances will be considered during project development on a case by case basis.

5.2.5 Segment 5 High Priority Strategies

Improvement options for high-priority strategies in Segment 5 are discussed below and identified on Figure 5-5. Given the constrained nature of this segment of I-70, optimizing use of the existing right-of-way in this segment is critical. The express lanes in this segment are currently underutilized, and options to repurpose the express lanes are being evaluated separately from this Study.

- Bring the facility to current standards:² Figure 5-5 shows three areas where curve straightening is recommended to improve sight distance at substandard curves. It is also recommended that narrow shoulders throughout this segment be brought to current standards. Several bridges currently have a vertical clearance of less than 16 feet 6 inches, which is the current standard. Vertical clearances at Goodfellow Road, Union Boulevard, Shreve Avenue, West Florissant Avenue, and Salisbury Street/McKinley Bridge could be brought to current standards as part of interchange reconfigurations recommended in the high-priority strategies for this segment. Vertical clearances at several other bridges could be brought to current standards when replacement of the bridges is warranted.
- Improve operations of interchanges/provide full access interchanges and reduce/eliminate conflict points at interchanges: Based on current LOS and crash data, interchange reconfigurations and minor interchange improvements are proposed to improve LOS and safety. These strategies could be applied by 1) reconfiguring existing diamond interchanges to single-point urban interchanges, 2) lengthening acceleration and deceleration lanes, 3) adding auxiliary lanes, 4) converting signalized intersections to roundabouts, or 5) adding turn lanes at ramp intersections.
- Consolidate and improve access points: It is recommended that this strategy be explored further to identify opportunities to consolidate access points as a means of improving traffic flow on I-70.
- Add and/or improve bike/ped facilities crossing I-70; improve bike/ped connections to the larger bike/ped network: Recommended bicycle and pedestrian improvements include adding traffic calming, shared lane markings, bike lanes, multi-use paths, two-way cycle tracks, and sidewalks in the Study Area consistent with the *Gateway Bike Plan* (as shown on Figure 5-5 and listed in Table 5-7). MoDOT-funded projects in the Study Area will seek to include bicycle and pedestrian improvements consistent with adopted plans.

² While future projects will seek to bring infrastructure to standards, this may not always be practicable. Design variances will be considered during project development on a case by case basis.

Table 5-7: Segment 5 Bicycle and Pedestrian Improvements

Roadway	From	To	Location	Action	
Traffic Calming					
Lillian Ave.	Goodfellow Blvd.	Kingshighway Blvd.	Both sides	Upgrade facility	
Shared Lane Markings					
Bermuda Dr.	Florissant Rd.	Elizabeth Ave.	Both sides	Add new facility	
Bike Lanes					
Florissant Rd.	Woodstock Rd.	Natural Bridge Rd.	Both sides	Add new facility	
Natural Bridge Rd.	Air Flight Dr.	Florissant Rd.		Upgrade facility	
Goodfellow Blvd.	W. Florissant Rd.	Natural Bridge Rd.		Add new facility	
Riverview Blvd.	I-70	W. Florissant Rd.		Upgrade facility	
Union Blvd.	West Florissant Rd.	Natural Bridge Rd.		Add new facility	
West Florissant Rd.	Goodfellow Blvd.	Cass Ave.			
Broadway	Riverview Blvd.	Grand Blvd.		Upgrade facility	
Broadway	Grand Blvd.	Cass Ave.			
Grand Blvd.	Natural Bridge Rd.	Broadway		Add new facility	
Multi-Use Paths					
Ted Jones Trail	Natural Bridge Rd.	Ferguson Ave.	N/A	Upgrade facility	
Lucas & Hunt Rd.	West Florissant Rd.	Natural Bridge Rd.	TBD		
Kingshighway Blvd.	Bircher Blvd.	Bircher Blvd. south	East side		
Grand Ave.	Broadway	Hall St.	South side	Add new facility	
Salisbury St.	Blair Ave.	Broadway			
Market St.	West Florissant Rd.	Broadway			
Trestle Trail	Cass Ave.	Broadway	N/A	Upgrade facility	
Two-Way Cycle Tracks					
Cass Ave.	14 th St.	Broadway	South side	Add new facility	
Mullanphy St.	Broadway	Riverfront Trail			
Sidewalks					
Bermuda Dr.	Santa Monica Ave.	Stanwood Dr.	East side	Upgrade facility	
Lucas & Hunt Rd.	West Florissant Rd.	Natural Bridge Rd.	Both sides		
Riverview Blvd.	I-70	West Florissant Rd.	West side		
Goodfellow Blvd.	West Florissant Rd.	Natural Bridge Rd.	Both sides		
Union Blvd.	West Florissant Rd.	Bircher Blvd.			
Kingshighway Blvd.	Bircher Blvd.	Bircher Blvd. south			
West Florissant Rd.	N. of I-70	Taylor Ave.			
Jennings Station Rd.	Beulah Ave.	Kenawah Ave.			
Shreve Ave.	Carter Ave.	Broadway			
Carrie Ave.	O'Fallon Park	Broadway			

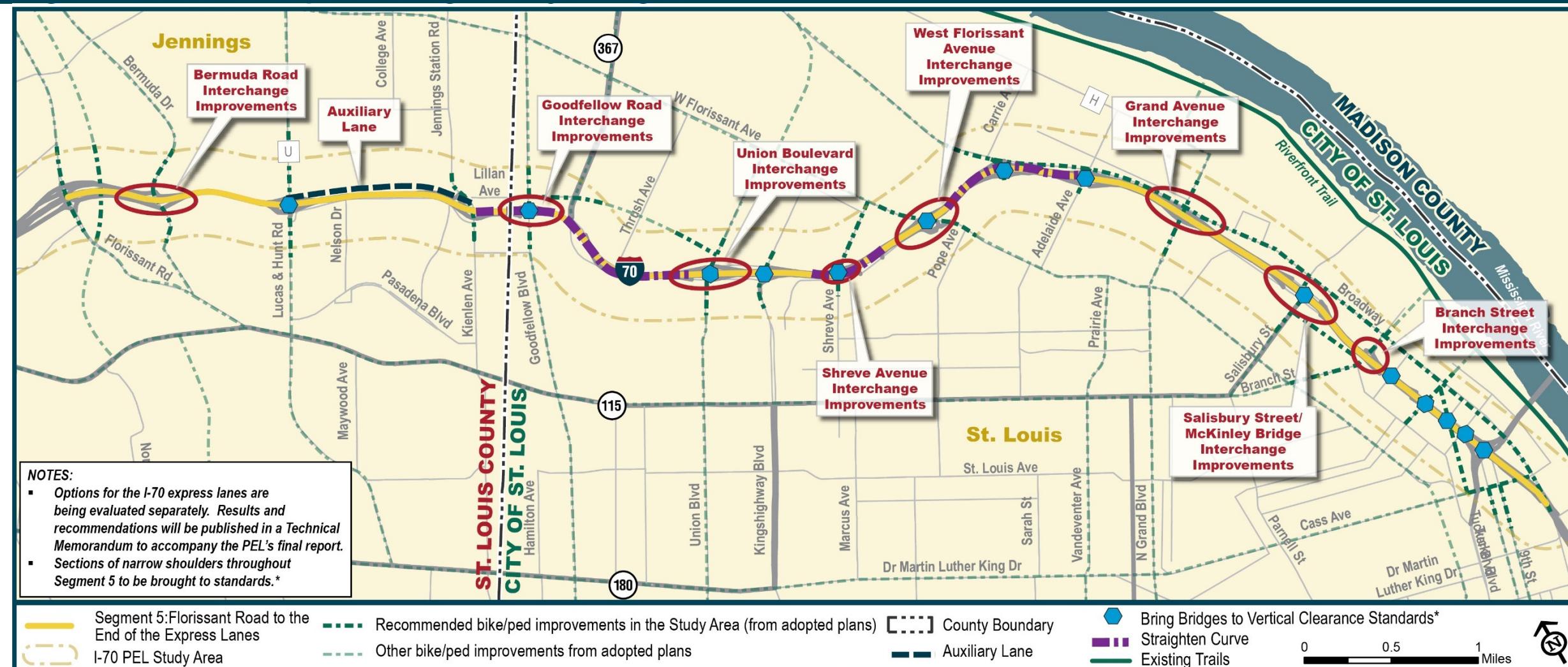
Note: While recommended bicycle and pedestrian improvements in this report focus on the I-70 Study Area, connectivity to existing and planned bicycle and pedestrian facilities is critical and should be considered during initiation and development of future projects. For informational purposes, the start and end points of bicycle and pedestrian improvements in this table include the entire segment recommended in adopted plans as sourced below.

Source: Project team, *Gateway Bike Plan* (Green Rivers Greenway 2011)

N/A – Not Applicable

TBD – To Be Determined

Figure 5-5: Segment 5: Illustrative Improvement Options for High-Priority Strategies



Segment 5 - High Priority Strategies:		Bermuda Road Interchange Improvements	Auxiliary Lanes	Goodfellow Road Interchange Option 1	Goodfellow Road Interchange Option 2	Union Boulevard Interchange Improvements	Shreve Avenue Interchange Improvements	West Florissant Avenue Interchange Improvements	Grand Avenue Interchange Improvements	Salisbury Street/McKinley Bridge Interchange Option 1	Salisbury Street/McKinley Bridge Interchange Option 2	Bridge Improvements	Straighten Curves	Shoulder Widening
Action Description	Full Interchange Reconfiguration	Add westbound auxiliary lane from Lucas-Hunt Road to Jennings Station Road	Option 1: Full Interchange Reconfiguration	Option 2: Minor Interchange Improvements	Full Interchange Reconfiguration	Minor Interchange Improvements	Partial Interchange Reconfiguration	Full Interchange Reconfiguration	Option 1: Full Interchange Reconfiguration	Option 2: Partial Interchange Reconfiguration	Bring Bridges to Vertical Clearance Standards*	Bring Curves to Standards*	Bring Narrow Shoulders to Standards	
Consolidate and improve access points	Recommend further study to consider potential locations for access consolidation along I-70.													
Bring facility to current standards*														
Improve operations of interchanges/provide full access interchanges	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reduce/eliminate conflict points at interchanges	✓		✓		✓			✓	✓	✓				
Add and/or improve bike/ped facilities crossing I-70; Improve bike/ped connections to the larger bike/ped network	Recommended bicycle and pedestrian improvement locations displayed on map.													

* While future projects will seek to bring infrastructure to standards, this may not always be practicable.

Design variances will be considered during project development on a case by case basis.

5.3 Evaluation Criteria for Future Project Proposals

Achieving the vision for the Study Corridor relies not only on developing and advancing projects based on the recommendations of this Study, but making sure that all projects in the Study Area consider and incorporate measures to support mode options, new technologies, and commerce; and provide connections that have a positive effect on surrounding neighborhoods. To supplement the general recommendations for Study Area improvements, the following questions will be used to assess how well project proposals align with the long-term vision established for the I-70 Study Corridor. This evaluation tool will apply to roadway improvement projects on routes that are owned or maintained by MoDOT, regardless of the project sponsor.

Evaluation Criteria for Future Project Proposals

- ◆ Does the proposed action address one of the recommended strategies for the segment? If so, which category: high-priority strategy, other recommended strategy, or long-term strategy?
- ◆ How does the proposed action allow for existing and planned transit infrastructure and operations in the project area?
- ◆ How does the proposed action encourage active transportation and facilitate planned bicycle and pedestrian facilities in the project area?
- ◆ How does the proposed action incorporate design measures and ITS elements to meet the needs of CVs and AVs as outlined in this Study?
- ◆ For actions involving capacity expansion on mainline I-70, how does the proposed action address recommended TDM measures as outlined in this Study?
- ◆ For actions involving interstate interchanges, accesses, or improvements to connecting or parallel routes, how does the proposed action provide efficient access to existing and planned businesses, employment centers, and freight hubs in the project vicinity?
- ◆ For actions in or adjacent to neighborhoods that pre-date the interstate, how does the proposed action lessen the highway's impact on adjacent neighborhoods?
- ◆ For actions in the vicinity of Lambert Airport, how does the proposed action improve access to the airport for passengers, employees, and freight/cargo?

The scoring system provided in Table 5-8 will be used to assess how future projects are consistent with the long-term vision. The TCIG assigned a weight to each criterion based on relative importance. An evaluation form, to be completed by project sponsors, is provided in Appendix F. Before a project in the Study Area is added to the TIP/STIP, MoDOT and/or EWG will review and consider the project evaluation results as part of the decision-making process to prioritize transportation needs each fiscal year.

Table 5-8: Scoring Guidelines for Evaluation Criteria

Score	Scoring Metrics
Does the proposed action address one of the recommended strategies for the segment?	
0	The proposed action does not address a recommended strategy for this segment.
1	The proposed action addresses one of the long-term strategies for this segment.
2	The proposed action addresses one of the other recommended strategies for this segment.
3	The proposed action addresses one of the high-priority strategies for this segment.
How do the design elements of the proposed action meet the needs of buses and large commercial vehicles (i.e., WB-67 vehicles)?	
0	The proposed action is located on a freight and/or transit route but will not meet the needs of a WB-67 vehicle.
1	The proposed action will not fully meet the needs of a WB-67 vehicle, but there is no current or planned freight use or bus routes through the project area.
2	The proposed action will be designed for a WB-67 vehicle.
3	Facilitating better freight and/or bus movement is a part of the project purpose and need or is included as a goal of the proposed action and is expected to be a primary outcome of the project. All project components will be designed for a WB-67 vehicle.
How does the proposed action allow for existing and planned transit infrastructure and operations in the project area?	
0	The proposed action does not allow for planned transit infrastructure/operations and/or adversely impacts existing transit infrastructure/operations.
1	The proposed action can accommodate existing/planned infrastructure/operations with minor modifications that are acceptable to the transit agency.
2	The proposed action allows for existing/planned transit infrastructure/operations.
3	The proposed action includes specific design elements to improve existing/planned transit infrastructure/operations.
How does the proposed action encourage active transportation and facilitate planned bicycle and pedestrian facilities in the project area?	
0	The proposed action does not include pedestrian or bicycle infrastructure and may preclude bicycle or pedestrian improvements from adopted plans.
1	The proposed action does not include pedestrian or bicycle infrastructure, but will not preclude bicycle or pedestrian improvements from adopted plans.
2	The proposed action includes some bicycle and pedestrian improvements, but is not completely consistent with adopted plans.
3	The proposed action incorporates all bicycle and pedestrian improvements in the project area proposed in adopted plans.
How does the proposed action incorporate design measures and ITS elements to meet the needs of CVs and AVs as outlined in this Study?	
0	The proposed action does not incorporate design measures or ITS elements to meet the needs of CVs and AVs and includes elements that may impede CV and AV use.
1	The proposed action, with respect to the needs of CVs and AVs, maintains current design measures and ITS elements in the project area.
2	The proposed action, with respect to the needs of CVs and AVs, incorporates design measures and/or ITS elements consistent with the recommendations of this Study.
3	The proposed action includes advancing ITS and/or implementing design measures to facilitate CV and AV as a part of the purpose and need, or includes them as a goal of the proposed action and is expected to be a primary outcome of the project.

Table 5-8: Scoring Guidelines for Evaluation Criteria

Score	Scoring Metrics
<p>The following evaluation criteria are specific to elements of the long-term vision that are relevant to specific segments of the Study Corridor or specific types of projects, and are thus scored as to how well they enhance or detract from those elements of the vision. Projects not applicable to these criteria and projects with only a marginal benefit are given a neutral score of zero.</p>	
<p>For actions involving capacity expansion on mainline I-70, how does the proposed action address recommended TDM measures outlined in this Study?</p>	
-1	The proposed action does not include TDM measures and may preclude future implementation of TDM measures such as HOV lanes or HOT lanes.
0	The proposed action does not preclude future implementation of TDM measures such as HOV or HOT lanes and indirectly addresses TDM by incorporating bike/ped facilities and/or facilitating existing and planned transit infrastructure/ operations.
0	The proposed action does not involve capacity expansion on mainline I-70.
1	TDM is a part of the project purpose and need or is included as a goal of the proposed action and is expected to be a primary outcome of the project.
<p>For actions involving interstate interchanges, accesses, or connecting/parallel routes, does the proposed action provide efficient access to existing and planned businesses, employment centers, and freight hubs in the project vicinity? (Excludes short-term construction-related impacts)</p>	
-1	The proposed action would result in access changes that would substantially impact the viability of businesses, employment centers, or freight hubs in the project vicinity.
0	The proposed action is not anticipated to adversely affect commercial access or may have minor adverse impacts to access for some commercial properties but those impacts can be mitigated and the overall effect on businesses, employment centers, and freight hubs in the project vicinity would be positive.
0	The proposed action does not involve interstate interchanges, accesses, or improvements to connecting or parallel routes.
1	Providing efficient access to businesses, employment centers, or freight hubs in the project vicinity is a part of the project purpose and need or is included as a goal of the proposed action.
<p>For actions in or adjacent to neighborhoods that pre-date the interstate, how does the proposed action lessen the highway's impact on adjacent neighborhoods?</p>	
-1	The proposed action would not address historic neighborhood impacts of the highway and may have adverse neighborhood impacts.
0	The proposed action is not adjacent to neighborhoods that pre-date the interstate.
0	The proposed action may have minor adverse impacts on surrounding neighborhoods but those impacts can be mitigated and the overall effect on surrounding neighborhoods is anticipated to be positive.
1	Lessening the highway's impact is a goal of the proposed action, which includes specific measures expected to have substantially positive impacts on surrounding neighborhoods. The proposed action is not anticipated to have any adverse impacts on surrounding neighborhoods.
<p>For actions in the vicinity of Lambert Airport, how does the proposed action improve access to the airport for passengers, employees, and freight/cargo?</p>	
-1	The proposed action would not improve access to the airport and/or may adversely impact access to the airport.
0	The proposed action may have minor adverse impacts to airport access, but those impacts could be mitigated and the overall effect on airport access would be positive.
0	The proposed action is not in the vicinity of Lambert Airport.
1	Improving airport access is either part of the project purpose and need or is included as a goal of the proposed action, which includes specific measures expected to have substantially positive impacts on airport access. The proposed action is not anticipated to have any adverse impacts to airport access.

6.0 Anticipated National Environmental Policy Act (NEPA) Process and Considerations

The screening and ranking of strategies considered key resources in the Study Area, which were those with the highest potential to influence decision-making for recommended transportation improvements.

This chapter provides an overview of potential environmental considerations in each segment of the Study Area, focusing on key resources with the highest potential to influence decision-making for recommended transportation improvements. It summarizes the setting and context of the Study Area and discusses the types of potential mitigation activities that may be required. To help facilitate advancement of projects to the next planning stage, it also discusses anticipated future resource analyses and NEPA classes of action for the recommended high priority transportation improvement strategies.

6.1 Study Area Resources

The environmental resources studied were identified based on Study Area characteristics and are consistent with NEPA, FHWA, and MoDOT guidelines. This Study also considered resources with additional regulatory requirements, such as the Endangered Species Act (ESA), the Clean Water Act (CWA), and the National Historic Preservation Act (NHPA) (Section 106), as well as resources that typically are of concern for the general public, such as traffic noise. A detailed description of Study Area resources in the built and natural environment, and the regulations pertaining to each resource, can be found in the *I-70 PEL Study Conditions Assessment Report* (Appendix A). The information on Study Area existing conditions was compiled and mapped using readily available data from local, regional, state, and federal agencies, Google Earth imagery, and U.S. Geological Survey (USGS) topographic maps.

The planning-level environmental analysis conducted for this PEL Study and presented in this chapter was used to inform the consideration and prioritization of potential transportation improvements in the Study Area presented in Chapter 4.0. As MoDOT identifies projects to advance in the Study Area, it will work with FHWA to determine the environmental clearances required under NEPA. Future NEPA studies will involve a more detailed analysis for environmental resources potentially impacted by the transportation improvement projects.

Key resources in the Study Area with the highest potential to influence decision-making for recommended transportation improvements are shown by segment in Figure 6-1 through Figure 6-5.

6.2 Potential Impacts and Mitigation Measures

Table 6-1 summarizes potential resource impacts and mitigation measures that will need to be considered in future NEPA processes.

Figure 6-1: Segment 1 Key Resources

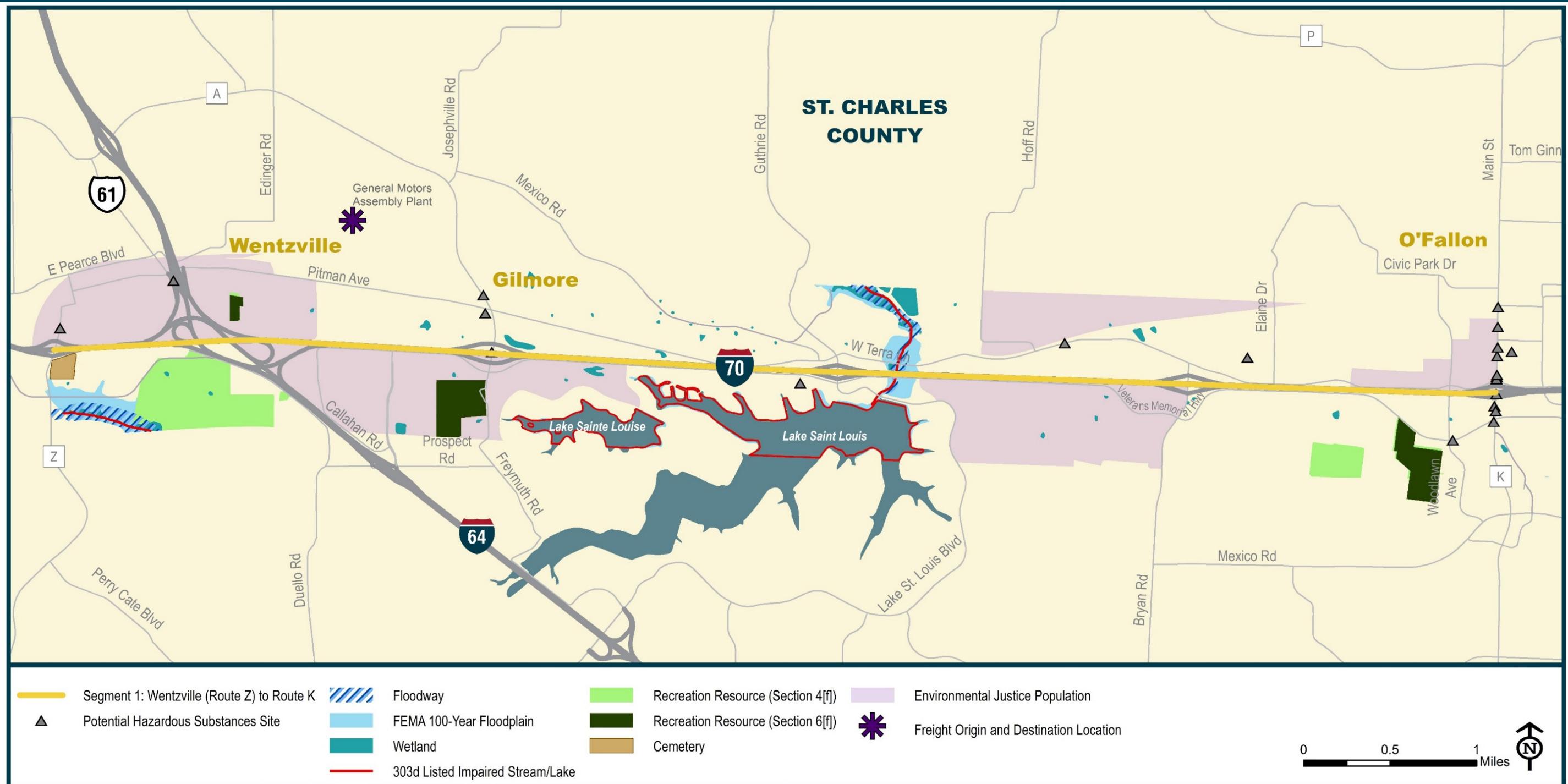


Figure 6-2: Segment 2 Key Resources

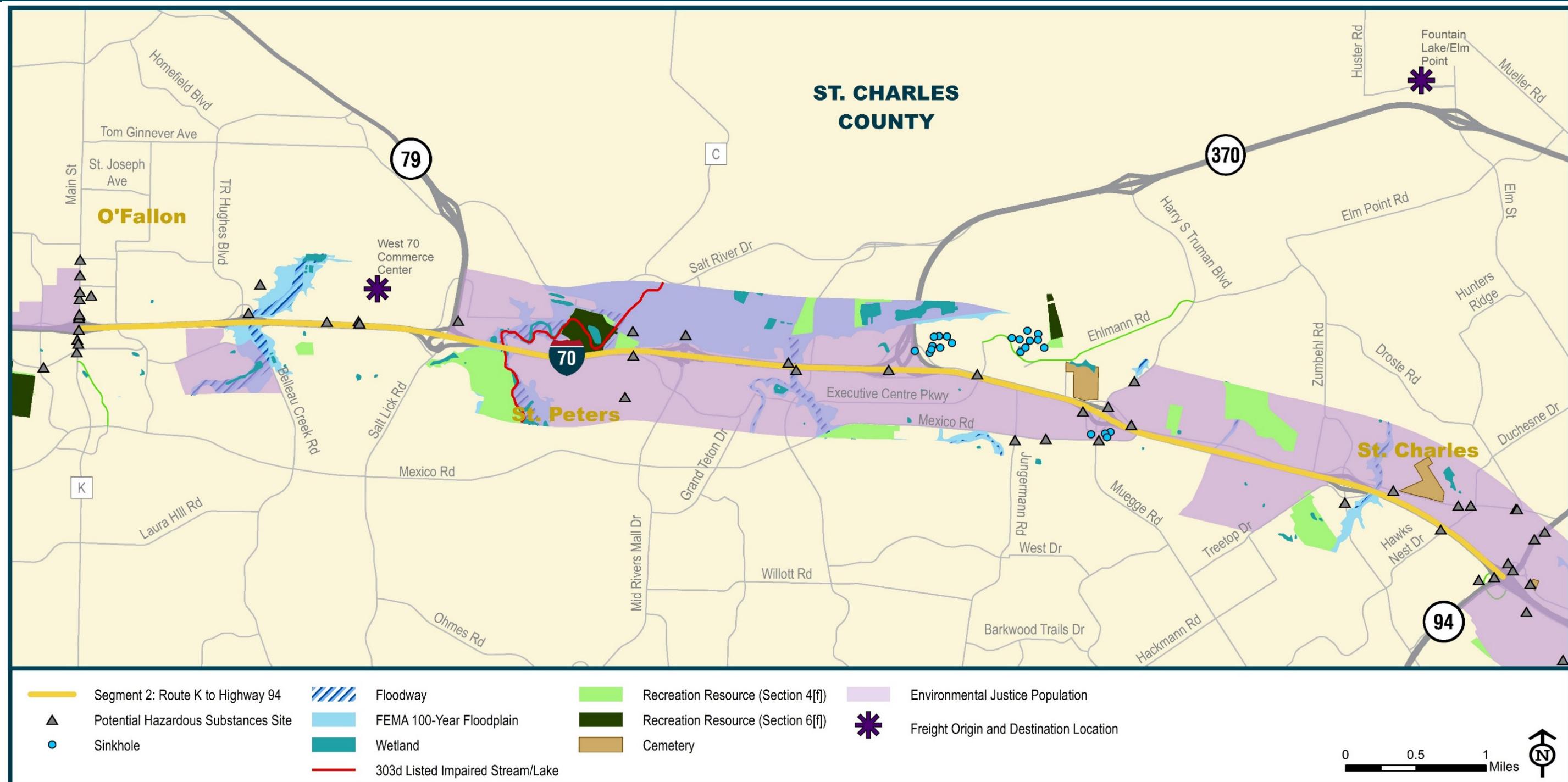


Figure 6-3: Segment 3 Key Resources

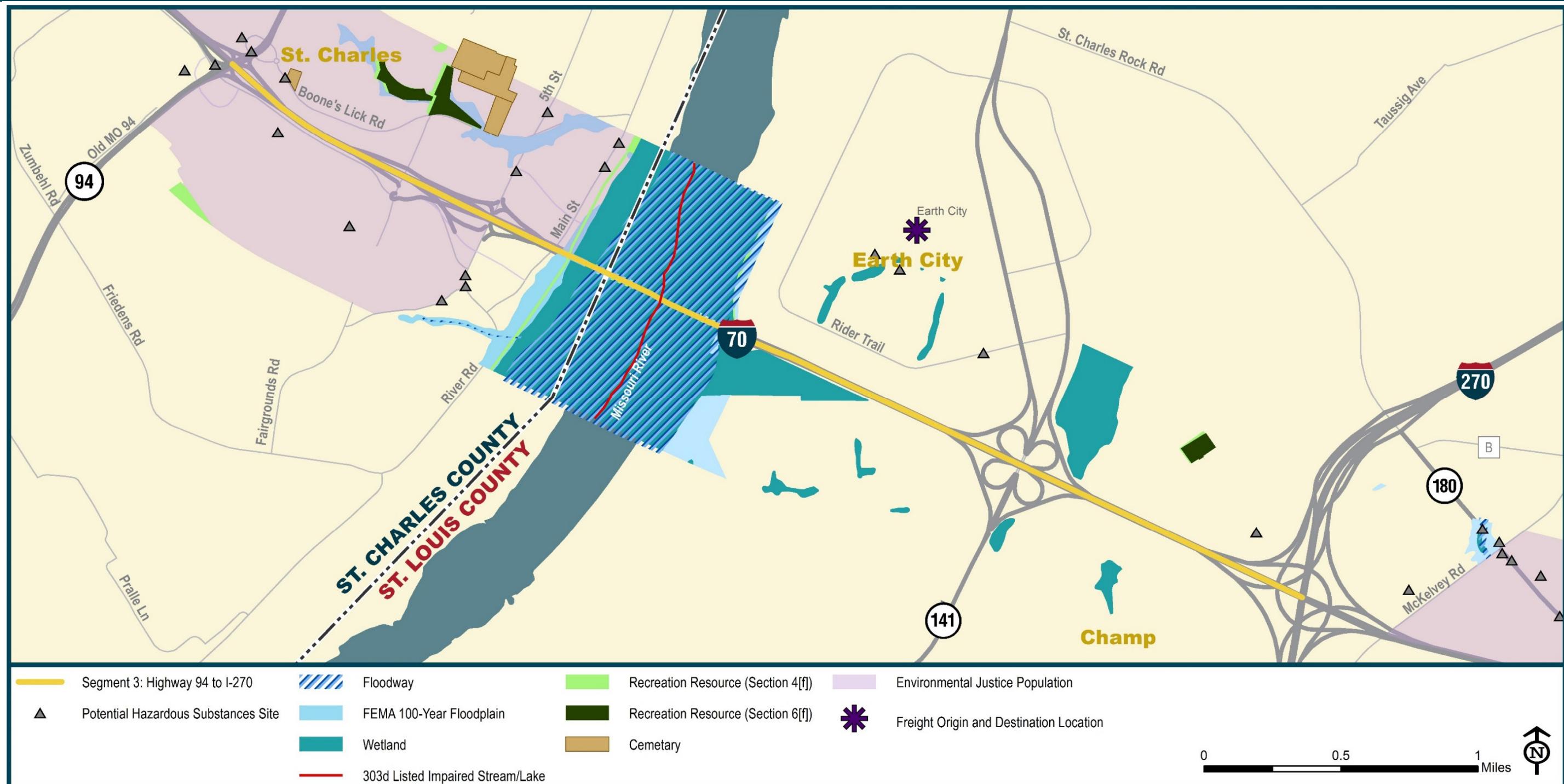


Figure 6-4: Segment 4 Key Resources

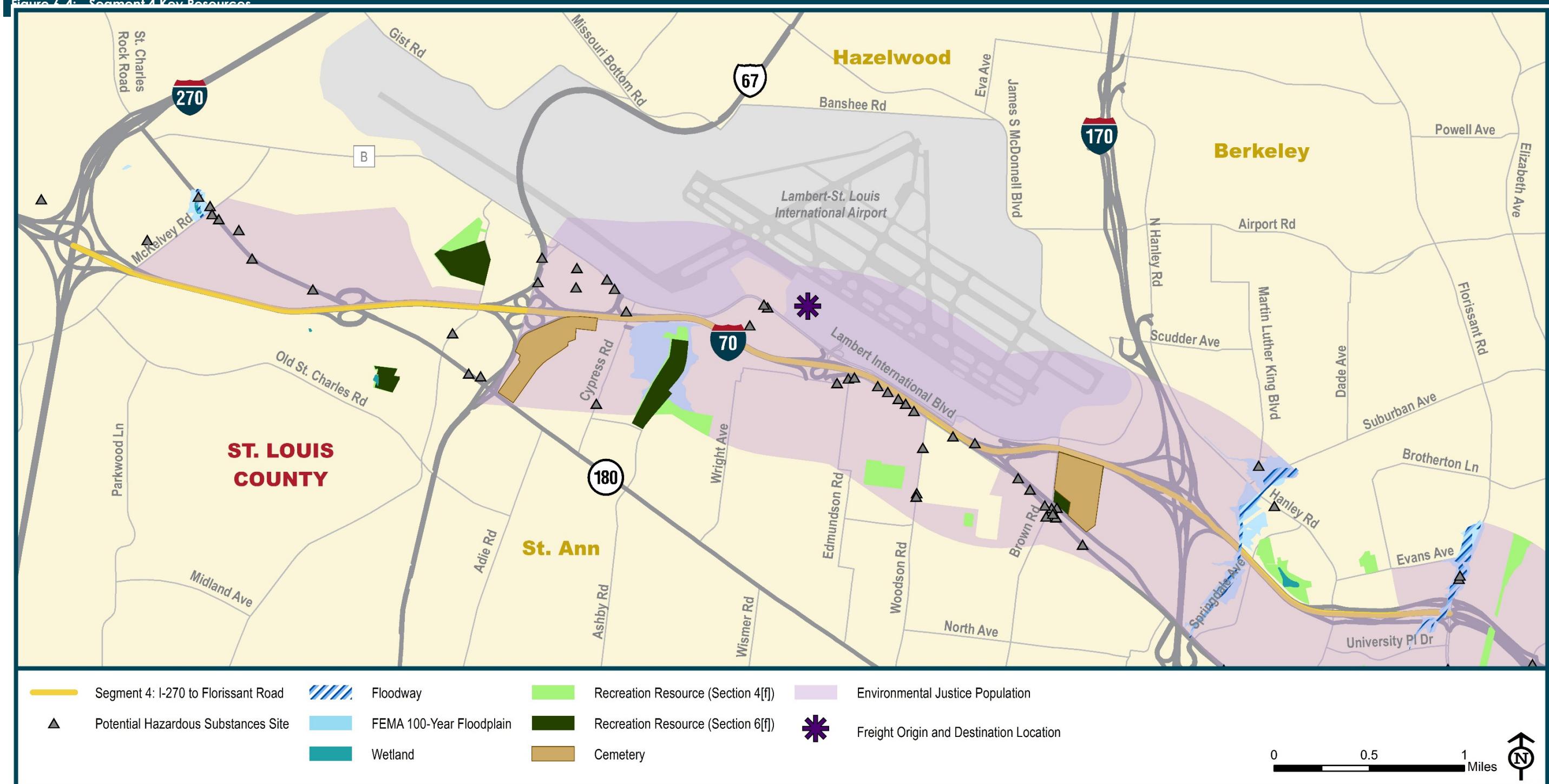


Figure 6-5: Segment 5 Key Resources

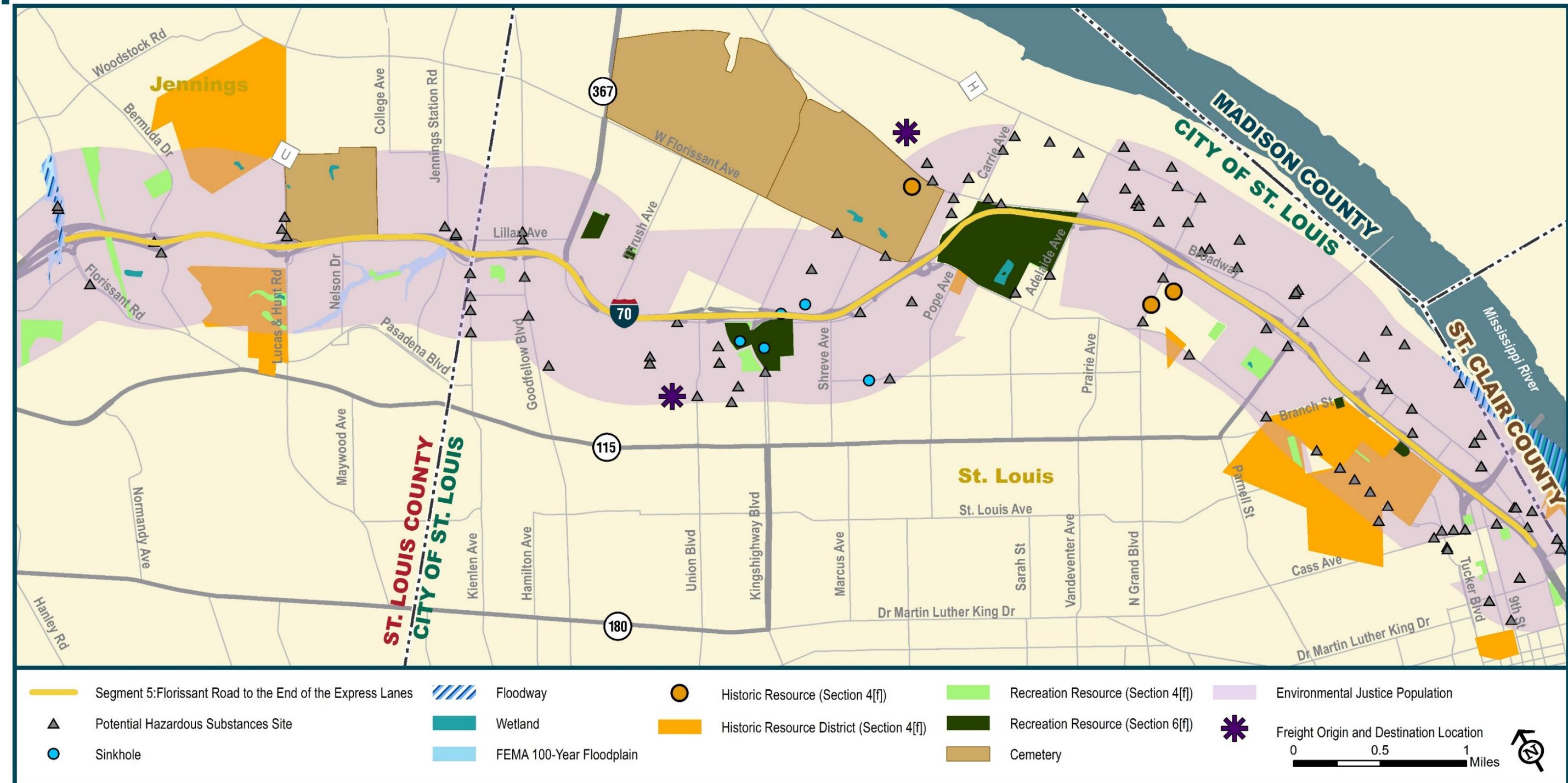


Table 6-1: Key Resources and Potential Impacts and Mitigation Measures

Resource	Potential Impacts and Mitigation Measures
Land Use	<p>Most of the Study Area is fully developed, with all segments having concentrations of commercial and residential uses, and scattered areas of industrial, institutional, and vacant/agricultural land use. Potential direct impacts include converting existing land use to transportation use and compatibility of improvements with existing and planned land uses (also refer to right-of-way discussion in this table). Potential indirect impacts include induced growth effects. Conversion of existing land use to a transportation use could potentially occur in all segments, but is not generally anticipated to result in relocations or land use changes that are inconsistent with local plans. Due to the more constrained right-of-way in Segment 5, some of the high-priority strategies could have more substantial land use impacts. The Study Area is mostly developed; therefore, induced growth effects are not expected. However, providing or improving interstate connections serving current and future development and redevelopment areas is a goal in Segments 2 – 5, and future projects are expected to facilitate these planned land use changes. During NEPA studies for future projects, potential land use impacts will be evaluated given existing and planned land uses at the time of study. Mitigation measures for unavoidable impacts may include seeking to minimize impacts during final design and working with local jurisdictions to incorporate proposed transportation improvements into future land use plans.</p>
Right-of-Way	<p>Most of the Study Area is fully developed, with all segments having concentrations of commercial and residential uses, and scattered areas of industrial, institutional, and vacant/agricultural land use. Potential right-of-way impacts include partial or full property acquisitions of property abutting the existing right-of-way. Because there is ample existing right-of-way in Segments 1 – 4, land acquisitions to implement high-priority strategies from this Study will likely consist primarily of partial acquisitions. Due to the more constrained right-of-way in Segment 5, some of the high-priority strategies could have more substantial impacts and may require displacements/relocations. NEPA studies for future projects will identify right-of-way impacts during preliminary and final design. Mitigation measures for unavoidable impacts may include seeking to minimize impacts during final design. Any property impacts that result from implementing federal-aid projects require compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act).</p>
Socioeconomics, Environmental Justice	<p>Environmental Justice (EJ) was identified as a national policy under Executive Order (EO) 12898 to ensure that minority and low-income communities do not receive disproportionately high and adverse human health or environmental impacts as a result of federal actions, and requires federal agencies to incorporate EJ into the NEPA process. EJ populations (minority or low-income) could experience right-of-way acquisitions, noise, visual, and air quality impacts. EJ populations are present in most of the Study Area segments, with Segment 3 having the lowest percentage and Segment 5 having the highest percentage of EJ populations. High-priority strategies in Segment 5 could impact EJ populations due to potential right-of-way acquisitions for those improvements. NEPA studies for future projects will assess if proposed improvements will result in disproportionate effects to EJ populations. If such impacts are expected, the analysis will assess whether the impacts are disproportionately high and adverse, as defined by FHWA guidance (https://www.environment.fhwa.dot.gov/env_topics/environmental_justice.aspx). For any adverse effects, MoDOT will evaluate measures to avoid and minimize impacts to disadvantaged communities. If impacts cannot be avoided, MoDOT will work with</p>

Table 6-1: Key Resources and Potential Impacts and Mitigation Measures

Resource	Potential Impacts and Mitigation Measures
	affected communities to develop mitigation measures to offset the impacts. This will require outreach to these communities to determine their needs and concerns.
Sinkholes	A sinkhole can form when a cave ceiling collapses. Sinkholes have been identified in Segments 2 and 5, with the highest concentration located in Segment 2. Sinkholes and associated cave systems in both of these segments could potentially be impacted by construction of the high-priority strategies identified for those segments. During NEPA studies for future projects, more detailed mapping of sinkholes and caves will be conducted. Sinkhole and cave locations will be considered as required for excavation activities and placement of support structures and drainage features. Project design will be modified as warranted to avoid, minimize, or mitigate impacts to these resources.
Water Resources and Floodplains	Water resources within the Study Area include surface water features, groundwater, major drainageways, and floodplains. Surface water features include rivers, streams, ponds, and lakes. Direct impacts could result from construction activities that cross (e.g., bridges) or are in proximity to these resources, changes to existing water conveyances (ditches, culverts), and encroachment on existing floodplains. Water quality could be impacted by sediments and contaminants introduced to water resources during construction and by increased impervious surface area that results in increased highway and roadway runoff. The high priority strategies could impact water resources and floodplains mostly in Segments 1 - 4. Segments 1, 2, and 3 contain 303(d)-listed impaired waterbodies that potentially could be impacted. Under future NEPA studies, water resources and floodplains within the Study Area will be inventoried and mapped, and current water quality information will be obtained. Mitigation measures could include implementing best management practices (BMPs) during construction; and designing post-construction BMPs. MoDOT will coordinate with the U.S. Army Corps of Engineers (USACE) regarding a Section 404 permit, if a permit is required. MoDOT also will coordinate with local Federal Emergency Management Agency (FEMA) floodplain officials and other local water resource agencies to avoid and minimize impacts during preliminary and final design to maintain compliance with applicable water quality regulations.
Wetlands/Waters of the U.S.	Wetlands are present within the Study Area along rivers, streams, ditches, irrigation canals, and ponds. Impacts could include direct permanent loss of wetlands due to dredging or placement of fill, or direct temporary loss of wetlands during construction. Indirect impacts could include increased stormwater runoff or hydrologic changes that affect wetland functions. Wetlands are located adjacent to existing right-of-way in Segments 1, 3, and 4. As such, the high priority strategies could potentially impact wetlands in those segments either permanently or temporarily during construction. During NEPA studies for future projects, wetland studies will be conducted to delineate wetland boundaries and determine affected wetland types and functional values. Wetland identification information will be made available to interested agencies. Per Section 404 of the Clean Water Act, impacts to wetlands and other water features must be avoided, minimized, or mitigated (in order of preference). All impacted wetlands will be mitigated in accordance with USACE's current mitigation policies and Section 404 Permit conditions.
Historic Resources (Section 4[f] properties)	Several resources listed on or eligible for listing on the National Register of Historic Places (NRHP) are located within the Study Area. The greatest areas of cultural concern in the Study Area are those where human burial sites are known to exist, including formal

Table 6-1: Key Resources and Potential Impacts and Mitigation Measures

Resource	Potential Impacts and Mitigation Measures
	<p>historic cemeteries, mounds, cairns, mortuary sites, and other archaeological sites where human remains have been reported. Some appear to have been destroyed by construction of the existing highway due to their proximity to the road. As such, remnants of burial grounds could remain and caution should be taken in these areas. Cemeteries are located adjacent to the existing right-of-way in Segments 1, 2, 4, and 5, and potentially could be impacted by high priority strategy improvements. Two bridges in the Study Area (Eads and McKinley) are on the Missouri Historic Bridge list, but will not be impacted by the high priority strategies. Several historic resources are present in Segment 5, some of which (including an historic district) are in proximity to existing right-of-way and potentially could be impacted. Under NEPA studies for future projects, Section 106 consultation will be conducted. This will include coordination with the State Historic Preservation Officer (SHPO), other consulting parties, and Native American Tribes; conducting surveys; and determining NRHP eligibility and effects. The likelihood of identifying NRHP-eligible resources is potentially higher in Segments 4 and 5 based on the age of surrounding buildings. In addition, historic resources are protected under Section 4(f) of the U.S. Department of Transportation (DOT) Act, and an evaluation of Section 4(f) use of affected historic resources will be required. Designers will work to avoid and minimize impacts during preliminary and final design. To address adverse effects to historic resources, MoDOT will develop a Memorandum of Agreement in consultation with the SHPO, other consulting parties, and tribes.</p>
Hazardous Materials Sites	<p>Hazardous materials may be encountered during construction; therefore, it is important to identify properties that may contain contamination prior to right-of-way acquisition and construction. Potential hazardous materials sites were identified in all segments. Segments 1, 2, 4, and 5 have hazardous materials sites located in proximity to high priority strategy improvements, with highest concentrations of these sites located in Segments 4 and 5. Under NEPA studies for future projects, a Phase I initial site assessment will be performed. Phase II site investigations may be required, depending on Phase I assessment results, project design, and location of proposed right-of-way acquisitions. For identified hazardous waste sites, mitigation could include, but is not limited to, undertaking analysis and proper disposal of contaminated soil and hazardous materials, contacting owners of subsurface utilities where excavation is planned to assess presence of asbestos pipe, and inspecting buildings and structures for presence of asbestos-containing materials and lead-based paint.</p>
Parks and Recreation Resources (including Section 4(f) and Section 6(f) properties)	<p>Parks and recreation resources are scattered throughout the Study Area, with several located in proximity to high priority strategy improvements in all segments. Potential impacts to these resources could include partial or full acquisition, access changes, visual, and noise. Under NEPA studies for future projects, park and recreation resources will be inventoried, mapped, and evaluated for potential impacts. Impact assessment will include consideration of measures to avoid and minimize impacts, and mitigation measures will be identified to address unavoidable impacts.</p> <p>Public recreation resources are protected under Section 4(f) of the U.S. DOT Act. Section 4(f) requirements stipulate that FHWA and other DOT agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless: 1) there is no feasible and prudent avoidance alternative to the use of land, and the action includes all possible planning to minimize harm to the property resulting from such use; or 2) FHWA determines that the use of the property will have a <i>de minimis</i> (negligible) impact.</p>

Table 6-1: Key Resources and Potential Impacts and Mitigation Measures

Resource	Potential Impacts and Mitigation Measures
	<p>Recreation resources developed with Land and Water Conservation Funds (LWCF) are protected by Section 6(f) of the Land and Water Conservation Act. Section 6(f) properties are adjacent to high priority strategy improvements in Segments 1, 2, and 5. During NEPA studies for future projects, conversion of any part of these sites to other than public outdoor recreation use will require approval from the appropriate National Park Service Regional Director. Conversion requests are only considered if all practicable alternatives to the proposed conversion have been evaluated and a replacement property meeting specific requirements has been identified.</p>
Traffic Noise	<p>Numerous noise-sensitive receptors, as defined in Section 3.2 of the Conditions Assessment Report provided in Appendix A, exist in the Study Area. During NEPA studies for future projects, construction of a roadway on a new location, significant changes to the horizontal or vertical road alignment, or increasing the number of through-traffic lanes will require investigation of traffic noise impacts per FHWA regulation 23 Code of Federal Regulations (CFR) 772. This analysis will also establish the need for and reasonableness of noise abatement measures. Typical noise abatement measures that are evaluated include altering the vertical or horizontal roadway alignment, traffic management/ restrictions, and traffic noise barriers such as earthen berms or masonry walls.</p>
Air Quality	<p>The U.S. Environmental Protection Agency (EPA) has designated St. Charles County (Segments 1, 2, and 3), St. Louis County (Segments 3, 4, and 5), and the City of St. Louis (Segment 5) as nonattainment areas for ozone. The City of St. Louis and the portion of St. Louis County in the Study Area are designated as maintenance areas for carbon monoxide (CO). This study is identified in the STIP for 2014-2018 as an environmental study; however, no portion of the project has been included within the fiscally constrained STIP. Under NEPA studies for future projects, air quality analyses will be prepared in accordance with air quality regulations and guidelines. Because the Study Area is in a nonattainment area, transportation conformity will need to be demonstrated before a project can be included in the EWG Long Range Plan or TIP.</p>
Upland Habitat, Threatened and Endangered Species	<p>As documented in the Conditions Assessment Report (Appendix A), several threatened or endangered species, three ecological service areas, nine state-listed endangered and state-ranked species, and natural communities of conservation concern were identified in the Study Area. Because Segments 4 and 5 are highly urbanized, the most likely areas of wildlife impacts are in Segments 1, 2, and 3. Potential impacts to wildlife generally include direct mortality during construction, habitat fragmentation or loss, road mortality, and bisection of wildlife corridors.</p>
	<p>If a federally-listed species or their habitat is determined to be affected by future projects during NEPA studies, design considerations will be evaluated to avoid impacts to these areas. If impacts are unavoidable, a biological assessment (with affect determination) will be required to be submitted to the U.S. Fish and Wildlife Service (USFWS) and USFWS consultation will be initiated. Similarly, if a state-listed species or its habitat is affected by the project, coordination will occur with the Missouri Department of Conservation. Mitigation measures may include design modifications to minimize potential impacts, preconstruction surveys, and establishing construction timelines to avoid disturbance of wildlife and habitat during sensitive periods such as breeding season.</p>

6.3 NEPA Classes of Action

NEPA establishes a national policy to protect the environment, which includes the assessment of potential environmental impacts of all major federal actions. Federal funds for NEPA studies are authorized through the STIP/TIP. Once project-level funding is secured, NEPA and preliminary design activities can be initiated. These activities will build on the existing conditions information, public and stakeholder outreach, transportation strategy analyses, and recommendations contained in this PEL Study.

There are three classes of action that prescribe the level of documentation required in the NEPA process, as summarized below. Refer to FHWA regulations (23 CFR 771.115 and 23 CFR 771.117) for details:

- **Class I (Environmental Impact Statement [EIS]):** Actions that significantly affect the environment require an EIS (40 CFR 1508.27). An EIS is a full disclosure document that details the process through which a transportation project was developed, includes consideration of a range of reasonable alternatives, analyzes the potential impacts resulting from the alternatives, and demonstrates compliance with other applicable environmental laws and executive orders.

- **Class II (Categorical Exclusion [CE]):** Actions that do not individually or cumulatively have a significant environmental effect are excluded from the requirement to prepare an EA or EIS. A list of CEs normally not requiring NEPA documentation is provided in 23 CFR 771.117(c). FHWA and MoDOT executed a programmatic agreement on June 19, 2018, that allows MoDOT environmental staff to approve projects on this list as CEs without FHWA concurrence. These are referred to as Programmatic Categorical Exclusions (PCEs). Per 23 CFR 771.117(b), any action that normally would be classified as a CE but could involve unusual circumstances will require FHWA, in cooperation with the applicant (MoDOT), to conduct appropriate environmental studies to determine if the CE classification is proper. Such unusual circumstances include:
 1. Significant environmental impacts;
 2. Substantial controversy on environmental grounds;
 3. Significant impact on properties protected by Section 4(f) of the DOT Act or Section 106 of the National Historic Preservation Act; or
 4. Inconsistencies with any Federal, State, or local law, requirement or administrative determination relating to the environmental aspects of the action.

The three classes of NEPA action include:

Class I –
Environmental Impact Statement (EIS)

Class II –
Categorical Exclusion (CE)

Class III –
Environmental Assessment (EA)

MoDOT prepares a PCE or a CE II form for actions qualifying for a CE, but requiring FHWA approval.

- **Class III (Environmental Assessment [EA]):** Actions in which the significance of the environmental impacts is not clearly established require preparation of an EA to determine the appropriate environmental document required. All actions that are not Class I or II are Class III. An EA:
 1. Provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.
 2. Aids an agency's compliance with NEPA when no environmental impact statement is necessary.
 3. Facilitates preparation of an environmental impact statement when one is necessary.

If it is determined under the EA that significant impacts will result, preparation of an EIS is required. If it is determined that no significant impacts will occur, a Finding of No Significant Impact will be prepared that will serve as the decision document for the proposed action.

Recommendations for NEPA classes of action are preliminary. MoDOT and FHWA will later determine the appropriate class of NEPA action for each project when they move into the NEPA phase and project-specific details are known.

6.3.1 Potential NEPA Classes of Action for High Priority Strategies

Table 6-2 identifies the potential NEPA classes of action that may be required for transportation improvement projects initiated to implement the high-priority strategies recommended in the Study. When projects move into the NEPA phase, MoDOT will consult with FHWA on the appropriate class of action, and FHWA will make the final determination. Determining the appropriate class of NEPA action will require project-specific details, including potential environmental impacts, that are not currently available at the time of this PEL Study. Therefore, future NEPA practitioners should understand the limitations of this information, particularly the preliminary recommendations on potential NEPA classes. Projects in the I-70 Study Area for which a NEPA decision document has been issued may require a reevaluation or new NEPA study depending on the nature of changes to the preferred alternative, changes in existing conditions, and the length of time since the decision was issued.

FHWA developed a standard questionnaire to guide PEL studies and help facilitate the transition to the NEPA phase for future projects. That questionnaire, provided in Appendix G, summarizes the information analyzed in this Study and issues that a future project team should be aware of to efficiently move future projects into the NEPA phase. FHWA has reviewed this PEL Study, and their letter of acceptance for this Study is provided in Appendix H.

Table 6-2: Potential NEPA Actions

Type of High Priority Improvement to be Considered	Potential NEPA Class of Action ³	Reference for NEPA Class of Action	General Section Discussion	Access Justification Required?
Parallel route improvements	PCE, CE II, or EA	23 CFR 771.117(b) 23 CFR 771.117(c)(22) 23 CFR 771.117(d) 23 CFR 771.115(c)	Identified for Segments 1, 2, and 3. This improvement may qualify for a PCE, if there are minimal environmental impacts, or a CE II if it will require more than minor right-of-way and result in displacements; result in an adverse effect under Section 106; result in use of a Section 4(f) resource (except <i>de minimis</i>). However, in Segments 1, 2, and 3, St. Charles County is considering changing the outer roads to one-way operations (one travel direction on one side of I-70 and the opposite travel direction on the other side). While this improvement may occur mostly within existing right-of-way, major changes in traffic operations and/or substantial controversy with adjacent business owners could require an EA.	Yes
Auxiliary lanes	PCE or CE II	23 CFR 771.117(a) 23 CFR 771.117(b) 23 CFR 771.117(c)(22) 23 CFR 771.117(c)(26) 23 CFR 771.117(d)(13) 23 CFR 771.117(e)	Identified for Segments 1, 2, and 5. May qualify for a PCE if improvements occur within existing right-of-way and no significant impacts will occur. This is the likely scenario in Segments 1 and 2, where an auxiliary lane could be constructed within existing right-of-way. This improvement may qualify for a CE II if it will require more than minor right-of-way and result in displacements; result in an adverse effect under Section 106; or result in use of a Section 4(f) resource (except <i>de minimis</i>).	Yes
Full interchange reconfiguration	CE II or EA	23 CFR 771.117(b) 23 CFR 771.115(c)	Identified for all segments. This improvement may qualify for a CE II if improvements occur within existing right-of-way, require minor right-of-way, or if no significant impacts would occur. This improvement may require an EA to determine the significance of potential impacts, such as EJ communities, historic resources, wetlands, floodplains, hazardous materials, noise, and visual conditions. This improvement likely will alter traffic patterns and/or access control, which may be controversial.	Yes

³ Considers US Department of Transportation, Federal Highway Administration Memorandum on Additional Flexibilities in Categorical Exclusions, From Hari Kalla, Acting associate Administrator for Planning, Environment, and Realty, dated May 22, 2017. https://www.environment.fhwa.dot.gov/legislation/nepa/memo_additional-flex.aspx Accessed 7/12/18.

Table 6-2: Potential NEPA Actions

Type of High Priority Improvement to be Considered	Potential NEPA Class of Action ³	Reference for NEPA Class of Action	General Section Discussion	Access Justification Required?
Partial interchange reconfiguration	PCE or CE II	23 CFR 771.117(a) 23 CFR 771.117(b) 23 CFR 771.117(c)(22) 23 CFR 771.117(c)(28) 23 CFR 771.117(d)(13) 23 CFR 771.117(e)	Identified for Segments 3, 4, and 5. This will likely include improvements such as bridge and ramp upgrades. Those improvements will likely qualify for a PCE if improvements occur within existing right-of-way and no significant impacts will occur. This improvement may qualify for a CE II if it will require more than minor right-of-way and result in displacements; result in an adverse effect under Section 106; result in use of a Section 4(f) resource (except <i>de minimis</i>); require changes in access control; or require construction of temporary access or closure of an existing road, bridge, or ramps resulting in major traffic disruptions.	Yes
Minor interchange improvements	PCE	23 CFR 771.117(a) 23 CFR 771.117(b) 23 CFR 771.117(c)(22)	Identified for all segments. These improvements will likely be minor, such as lengthening an acceleration/deceleration lane or adding turn lanes at a ramp signal. These improvements will qualify for a PCE because they will likely occur within existing right-of-way with no significant impacts.	Yes
Intersection reconfiguration	PCE or CE II	23 CFR 771.117(a) 23 CFR 771.117(b) 23 CFR 771.117(c)(22) 23 CFR 771.117(d) 23 CFR 771.117(e)	Identified for Segment 1. Most of these improvements will be minor (e.g., converting a signalized intersection to a roundabout or converting a stop-controlled intersection to a signal or roundabout). Most areas where these improvements are proposed will qualify for a PCE if improvements occur within existing right-of-way and no significant impacts will occur. This improvement may qualify for a CE II if it will require more than minor right-of-way and result in displacements; result in an adverse effect under Section 106; result in use of a Section 4(f) resource (except <i>de minimis</i>).	Yes
Minor intersection improvements	PCE	23 CFR 771.117(a) 23 CFR 771.117(b) 23 CFR 771.117(c)(22)	Identified for Segment 1. These improvements would include minor changes such as adding a turn lane, and likely will qualify for a PCE because improvements are expected to occur within existing right-of-way with no significant impacts.	Yes

Table 6-2: Potential NEPA Actions

Type of High Priority Improvement to be Considered	Potential NEPA Class of Action ³	Reference for NEPA Class of Action	General Section Discussion	Access Justification Required?
New access to I-70	CE II	23 CFR 771.117(b) 23 CFR 771.117(d)(7) 23 CFR 771.117(e)(5)	Identified for Segment 1. This improvement will require a CE II because it involves a change in access control. A CE II can be used if negligible to minor impacts are expected. If more than minor right-of-way is required or would result in displacements; result in an adverse effect under Section 106; result in use of a Section 4(f) resource (except <i>de minimis</i>), a CE II would be prepared.	Yes
Access consolidation	CE II	23 CFR 771.117(b) 23 CFR 771.117(d)(7) 23 CFR 771.117(e)(5) 23 CFR 771.115(c)	Access consolidation, identified for Segments 4 and 5, will likely require use of collector/distributor lanes. This improvement will require a CE II because it involves a change in access control, and also because it could require more than minor right-of-way and result in displacements; result in an adverse effect under Section 106; result in use of a Section 4(f) resource (except <i>de minimis</i>); or require construction of temporary access or closure of an existing road, bridge, or ramps resulting in major traffic disruptions.	Yes
Bridge replacement	PCE, CE II, or EA	23 CFR 771.117(a) 23 CFR 771.117(b) 23 CFR 771.117(c)(22) 23 CFR 771.117(c)(28) 23 CFR 771.117(d)(13) 23 CFR 771.117(e) 23 CFR 771.115(c)	Bridge replacements, recommended in Segments 4 and 5, may qualify for a PCE if improvements occur within existing right-of-way and no significant impacts will occur. This improvement may qualify for a CE II if it will require more than minor right-of-way and result in displacements; result in an adverse effect under Section 106; result in use of a Section 4(f) resource (except <i>de minimis</i>); or require construction of temporary access or closure of an existing road, bridge, or ramps resulting in major traffic disruptions. If the significance of the impacts has not been established, an EA will be required to determine impacts.	Potentially
Curve straightening	PCE or CE II	23 CFR 771.117(c)(22)	Identified for Segments 4 and 5. This improvement may qualify for a PCE if improvements occur within existing right-of-way and no significant impacts will occur. If improvements will require more than minor right-of-way and result in displacements; result in an adverse effect under Section 106; result in use of a Section 4(f) resource (except <i>de minimis</i>); require changes in access control; or require construction of temporary access or closure of an existing road, bridge, or ramps resulting in major traffic disruptions, a CE II would be prepared.	No

Table 6-2: Potential NEPA Actions

Type of High Priority Improvement to be Considered	Potential NEPA Class of Action ³	Reference for NEPA Class of Action	General Section Discussion	Access Justification Required?
Shoulder widening	PCE or CE II	23 CFR 771.117(a) 23 CFR 771.117(b) 23 CFR 771.117(c)(22) 23 CFR 771.117(c)(26) 23 CFR 771.117(d)(13) 23 CFR 771.117(e)	Identified for Segments 5. This improvement may qualify for a PCE if improvements occur within existing right-of-way and no significant impacts will occur. It will qualify for a CE II if it will require more than minor right-of-way and result in displacements; result in an adverse effect under Section 106; or result in use of a Section 4(f) resource (except <i>de minimis</i>). As compared with other segments, there is a high likelihood of impacts to historic resources in Segment 5 if improvements occur outside existing right-of-way due to the age of development in that area and its proximity to I-70.	No
Add/improve bicycle/pedestrian facilities	PCE	23 CFR 771.117(a) 23 CFR 771.117(b) 23 CFR 771.117(c)(3)	Identified for all segments. Construction of bicycle and pedestrian lanes, paths and facilities normally do not require further NEPA approvals by the FHWA and quality for PCEs.	No

6.4 Independent Utility and Logical Termini

If an improvement project has independent utility (can operate acceptably without depending on other projects), it can be considered by itself in a CE, EA, or EIS.

In developing an improvement project that can be advanced through the stages of planning, environmental assessment, design, and construction, MoDOT must demonstrate that each improvement project has independent utility and logical termini. The purpose of determining independent utility is to confirm that each improvement project is able to operate independent of other projects and that I-70 will operate acceptably at the conclusion of each project. To have independent utility, the improvement project cannot depend on any other projects – it must be able to be completed and function properly without other improvements. If an improvement project has independent utility, that singular project can be considered by itself in a CE, EA, or EIS.

The term “logical termini” is related to independent utility and is defined as the rational end points for a transportation improvement (the project limits) and the rational end points for assessing environmental impacts. The intent of establishing logical termini is to ensure that proposed transportation improvements satisfy an identified need, avoid unexpected side effects, and that environmental considerations can be sufficiently evaluated. MoDOT must demonstrate to FHWA that an improvement project has logical termini, and FHWA makes the final determination. Refer to this link for more info: https://www.environment.fhwa.dot.gov/legislation/nepa/guidance_project_te_rmini.aspx.

7.0 References

Bureau of Transportation Statistics 2017. Freight Facts and Figures. Available online at <https://www.bts.gov/product/freight-facts-and-figures>. Accessed October 2018.

Cities of Edmundson, Overland, St. John, and Woodson Terrace 2014. Four Communities Bikeable Walkable Plan. June.

City of O'Fallon 2014. I-70 Traffic Flow Improvements Project. January. Available online at <https://www.ofallon.mo.us/i-70-improvements-project>. Accessed October 2018.

_____ 2016. O'Fallon Connected: Highway K. February.

City of St. Ann 2015. Cypress Corridor Study.

City of St. Charles 2012. Congestion Reduction Study: I-70 Zumbehl and Cave Springs Interchange. May. Available online at http://www.morail.org/business/consultant_resources/documents/CongestionReductionStudy.pdf. Accessed October 2018.

_____ 2016. Bicycle & Pedestrian Master Plan. October. Available online at <https://www.stcharlescitymo.gov/781/Bicycle-Pedestrian-Master-Plan>. Accessed October 2018.

_____ 2017. City of St. Charles Capital Improvement Plan (CIP) 2018-2023. Approved December 2017. Available online at <https://www.stcharlescitymo.gov/157/Financial-Reports>. Accessed October 2018.

City of St. Louis 2013. North Riverfront Commerce Corridor Land Use Plan. January. Available online at <https://www.stlouis-mo.gov/government/departments/planning/documents/north-riverfront-commerce-corridor-land-use-plan11.cfm>. Accessed October 2018.

City of St. Louis and St. Louis County 2013. St. Louis Rapid Transit Connector Study. December.

City of St. Peters 2011. Mid Rivers Mall Drive/I-70 & Route 79/I-70 Interchange Study. February.

_____ 2017. Capital Improvement Plan (CIP) 2016/17-2021/22. Published May 2017. Available online at <https://www.stpetersmo.net/finance.aspx>. Accessed October 2018.

East West Gateway Council of Governments (EWG) 2008. Northside-Southside MetroLink Conceptual Design Study. October. Available online at <https://www.ewgateway.org/library-post/northside-southside-metrolink-corridor-study/>. Accessed October 2018.

EWG 2013. St. Louis Regional Freight Study. June. Available online at <https://www.ewgateway.org/wp-content/uploads/2017/08/FreightStudyFinalRpt.pdf>. Accessed October 2018.

_____ 2015. Connected2045 Long-Range Transportation Plan for the St. Louis Region. Available online at <https://www.ewgateway.org/library-post/connected2045-long-range-transportation-plan/>. Accessed October 2018.

_____ 2017. Transportation Improvement Program (TIP) FY 2018-2021. Approved August 2017. Available online at <https://www.ewgateway.org/transportation-planning/transportation-improvement-program/>. Accessed October 2018.

_____ 2018. Northside-Southside Light Rail Project for the St. Louis Region. Summer 2018. Available online at http://www.northsidesouthsidestl.com/wp-content/uploads/2018/08/NorthsideSouthside_ExecutiveSummary_Aug2018_Digital.pdf. Accessed October 2018.

Federal Highway Administration (FHWA) 2009. Improve I-70 Record of Decision, FHWA-MO-EIS-09-01 FSEIS, Interstate 70 Corridor, Kansas City to St. Louis, Missouri, Supplemental Environmental Impact Statement. August. Available online at <http://www.improvei70.org/pdf/FinalI70SEIS.pdf>. Accessed October 2018.

Great Rivers Greenway 2011. Gateway Bike Plan-Regional Routes to Sustainability. August. Available online at https://altaplanning.com/wp-content/uploads/Gateway_Bike_Plan.pdf. Accessed October 2018.

Metro n.d. Metro Reimagined Study. In progress.

_____ 2010. Moving Transit Forward, St. Louis Regional Long-Range Transit Plan. April. Available online at <https://www.metrostlouis.org/moving-transit-forward>. Accessed October 2018.

_____ 2013. St. Louis Rapid Transit Connector Study. December.

Missouri Department of Transportation (MoDOT) 2012. I-270 North Corridor Study. October.

_____ 2016. I-270 North Environmental Assessment. November.

_____ 2016b. MoDOT Engineering Policy Guide, Category: 232 Facility Selection. February. Available online at http://epg.modot.org/index.php/Category:232_Facility_Selection. Accessed October 2018.

- _____ 2017a. I-70 Planning and Environmental Linkages (PEL) Study Conditions Assessment Report. May 2017.
- _____ 2017b. Freight on the Move, Missouri State Freight Plan. Available online at <http://www.modot.org/othertransportation/freight/FreightPlan.htm>. Accessed October 2018.
- _____ 2017c. Bi-Monthly Mobility Report. May/June.
- _____ 2017d. Pavement condition and treatment data. November.
- _____ 2017e. MoDOT's Gateway Guide. 2017. Available online at <http://www.gatewayguide.com/history.html>. Accessed October 2018.
- _____ 2017f. Statewide Transportation Improvement Program (STIP) 2018-2022. Approved July 2017.
- _____ 2017g. St. Louis District Safety Project. Spring 2017. Available online at <https://www.modot.org/st-louis-safety-design-build-project>. Accessed October 2018.
- _____ 2018a. Missouri's Interstate System: Yesterday, Today and Tomorrow.
- _____ (2014) 2018b. A Vision for Missouri's Transportation Future, Missouri Long Range Transportation Plan. 2014; updated 2018. Available online at <http://www2.modot.org/LRTP/>. Accessed October 2018.
- _____ 2018c. Major Projects 2018-2019. Updated January 2018.
- _____ 2018d. St. Charles County Major Construction Projects 2018-19. Updated January 2018. Available online at <https://www.modot.org/st-charles-county-construction>. Accessed October 2018.
- St. Charles City 2016. Missouri River Crossing Study. Approved Spring 2016. Available online at <https://www.stcharlescitymo.gov/DocumentCenter/View/1185/I-70-Pedestrian-Bridge-Executive-Summary-with-Table?bidId=>. Accessed October 2018.
- St. Charles County 2012. Interstate I-70 Cave Springs Interchange Revision and One-Way Outer Roads between Cave Springs and Mid Rivers Mall Drive CMAQ Application. March.
- St. Louis County 2017. St. Louis County 2018-2022 Capital Improvement Program. Available online at https://www.stlouisco.com/portals/8/docs/document%20library/budget/2018/RecommendedBudget/2018_Recommended_Budget.pdf. Accessed October 2018.
- St. Louis Regional Freightway 2017. Freight Development Plan. May. Available online at <https://www.thefreightway.com/wp-content/uploads/2017/05/TheFreightway2017Project-SheetsFINAL.pdf>. Accessed October 2018.

_____ 2018. Project list. Available online at <http://www.thefreightway.com/about/plans>. Accessed October 2018.

Transportation Information Center 2002a. Pavement Surface Evaluation and Rating (PASER) Manual, Asphalt Roads. Available online at <http://www.apa-mi.org/docs/Asphalt-PASERManual.pdf>. Accessed October 2018.

_____ 2002b. Pavement Surface Evaluation and Rating (PASER) Manual, Concrete Roads. Available online at <https://www.ctt.mtu.edu/sites/default/files/resources/paser/concretepaser.pdf>. Accessed October 2018.

U.S. Census Bureau 2016. 2016 Census Population Estimates.

Wilbur Smith Associates 2009. St. Louis Truck Lane Corridor Study. January.

8.0 Glossary

Term	Definition
Annual average daily traffic (AADT)	Daily traffic volumes averaged over all 365 days in the year.
Auxiliary lane	A lane that extends between a freeway on-ramp and off-ramp. They are added on freeways to reduce impacts of heavy on-ramp traffic merging with a freeway through lane.
Best management practices	Techniques to either reduce soil erosion or remove sediment and pollutants from surface runoff.
Big box	A physically large retail establishment, usually part of a chain.
Bottleneck	A localized disruption of vehicle traffic on a street or highway that can be caused by the design or condition of a road, poorly-timed traffic signals, or sharp curves. They also can be caused by temporary situations, such as vehicle accidents.
Capacity	The maximum number of vehicles that can be expected to pass through a given segment of roadway or lane during a given period of time, measured in vehicles per hour or passenger cars per hour.
Caves	A cavity formed beneath the earth's surface, when water dissolves the limestone or dolomite by chemical action.
Clean Water Act	The Clean Water Act establishes the basic structure for regulating discharges of pollutants into the waters of the U.S. and regulating quality standards for surface waters.
Cloverleaf Interchange	A highway interchange at which two highways, one crossing over the other, have a series of entrance and exit ramps resembling the outline of a four-leaf clover and enabling vehicles to proceed in either direction on either highway.
Corridor	A tract of land in which one main line for a mode of transport has been built. A highway corridor is a general path that a highway follows.
Criteria pollutant	A pollutant determined to be hazardous to human health and regulated under the Environmental Protection Agency's National Ambient Air Quality Standards.
Cross-section	A cross-section is a vertical plane (slice) showing the various elements that make up the road and their widths. Typical roadway cross-section elements include shoulders, sidewalks, travel lanes, turn lanes, and medians.

Term	Definition
Cultural resource	The physical remains of past human activity having demonstrable association with prehistoric or historical events, individuals, or cultural systems. Cultural resources may include archaeological sites, districts, and objects; standing historical structures, objects, or groups of resources; locations of important historic events; or places, objects, and living or nonliving things that are important to the practice and continuity of traditional cultures.
Cumulative impacts	Impacts that occur when the effects of an action are added to or interact with the effects of other human-initiated actions or natural events in a particular place and within a particular timeframe. Other known past, present, and future actions must be taken into account. Cumulative impacts combine to produce effects that are different than if each occurred in isolation. The Council on Environmental Quality (CEQ) requires that these impacts be addressed in National Environmental Policy Act documents. The study area is usually larger and the timeframe longer than for direct and indirect effect analyses.
Cuts and fills	Cut and fill areas result from earthmoving during construction. A cut is created when soil or rock material from a hill is removed for construction, and conversely, fill is created when soil or rock is added to a low area.
Design speed	The maximum speed at which a vehicle can be operated safely on a road in perfect conditions.
Diamond-type interchange	A common type of road junction, used where a freeway crosses a minor road. The freeway itself is grade-separated from the minor road, one crossing the other over a bridge. Approaching the interchange from either direction, an off-ramp diverges only slightly from the freeway and runs directly across the minor road, becoming an on-ramp that returns to the freeway in similar fashion, giving the interchange a diamond shape when viewed from above.
Direct impact	Impacts which are experienced immediately due to project implementation.
Directional interchange	An interchange where one or more left-turning movements are provided by direct connection, even if the minor left-turn movements are accommodated on loops.
Directional system interchange	A directional interchange that connects freeways to freeways.
Environmental Justice	The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.
Floodplain	An area adjacent to a stream or river that is inundated periodically by high volume flows.

Term	Definition
Floodway	An area of floodplain that has been defined to be "reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height."
Forest Service sensitive species	Those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by: a) Significant current or predicted downward trends in population numbers or density; b) Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.
Freeway	A divided arterial highway designed for the unimpeded flow of large traffic volumes. Access to a freeway is rigorously controlled and intersection grade separations are required.
Frontage roads	A frontage road (also access road, service road, and many other names) is a road running parallel to a higher-speed road, usually a freeway, and feeding it at appropriate points of access (interchanges).
Geographic Information System (GIS)	A computerized data management system designed to capture, store, retrieve, analyze, and display geographically referenced information. An environmental inventory is a collection of GIS data pertaining to a geographic area, and it can be used in environmental analysis and documentation for highway projects.
Geologic hazard	A naturally occurring or man-made geologic condition or phenomenon that presents a risk or potential danger to life and property. Examples include landslides, flooding, earthquakes, ground subsidence, faulting, dam leakage and failure, mining disasters, pollution, and waste disposal.
Grade-separated junction	An intersection where one road passes over another road on a bridge. Adding ramps to a grade separation, providing access from one road to another, creates an interchange.
Gross regional product	One of several measures used to estimate the size of a metropolitan area's economy. The market value of all final goods and services produced within a metropolitan area in a given period of time.
Historic property	A legal term that refers specifically to any property (historic or prehistoric) listed on or eligible for inclusion in the National Register of Historic Places (National Register). A historic property can be an archaeological site, a historic site, or a traditional use area. Not all such sites meet the specific National Register criteria for historic property designation.

Term	Definition
HOV/HOT lanes	A high occupancy vehicle (HOV) lane is an exclusive traffic lane or facility limited to carrying high occupancy vehicles and certain other qualified vehicles. An HOV is a passenger vehicle carrying more than a specified minimum number of passengers (for example, an automobile carrying more than one or more than two people). HOVs include carpools and vanpool as well as buses. A high occupancy toll (HOT) lane is an HOV facility that allows lower occupancy vehicles (that is, solo drivers) to use these facilities in return for toll payments, which could vary by time-of-day or level of congestion.
Impervious surface	A surface that does not absorb fluids, such as pavements (roads, sidewalks, driveways and parking lots) that are covered by impenetrable materials such as asphalt, concrete, brick, and stone—and rooftops
Indirect impact	An impact that is reasonably foreseeable and caused by a project, but occur at a different time or place.
Induced growth	Land development or economic growth that occurs in response to changes in the natural or built environment, such as changes to a transportation facility.
Intelligent Transportation Systems	The application of advanced technologies to improve the safety and efficiency of transportation systems by providing information to users so they can be better informed and make safer, more coordinated, and "smarter" use of transport networks.
Jurisdictional wetland	Jurisdictional wetlands are those that are regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act.
Karst	A landscape where underground water follows dissolved out-channels in the rock. Karst is made up of four primary features: sinkholes, losing streams, springs, and caves.
Level of Service (LOS)	A qualitative measure of the operational characteristics of a traffic stream, ranked from A (best) to F (worst). LOS is described in terms of speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.
Limited access freeway	A limited-access or controlled-access highway may be defined as a highway especially designed to expedite and control through traffic, primarily by means of median dividers or strips, elimination of grade level intersections.
Losing streams	A surface stream that loses a significant amount of its flow to the subsurface through bedrock openings.
Low-income population	Low-income populations are defined using income limits set annually by the U.S. Department of Housing and Urban Development (HUD), which considers individuals and households earning less than 30 percent of the area median income of a community to be low-income. Income limits are adjusted for household size to establish county-specific low-income thresholds.

Term	Definition
Minority population	Minorities are defined as persons who are Black, Hispanic, Asian American, or Native American Indian or Alaskan.
Mitigation measure	Action developed in response to an impact identified in the analysis that could be taken to avoid, reduce, or compensate for the projected impact. Usually includes appropriate monitoring and enforcement activities to comply with NEPA's intent.
Mobility	The ability of traffic or other travel modes to move unimpeded through a highway or other transportation facility.
Multi-modal	Involving various modes of highway and non-highway transportation, such as rail, transit, walking, and bicycling
National Ambient Air Quality Standards	The maximum permissible concentrations for certain pollutants, known as criteria pollutants, which include carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO ₂), particulate matter (PM ₁₀ and PM _{2.5}), ozone (O ₃), and sulfur dioxide (SO ₂).
National Environmental Policy Act (NEPA)	The National Environmental Policy Act (NEPA) of 1969 establishes policy, sets goals, and provides means for the protection of the environment in federal decision-making. Under NEPA, all federal agencies must consider the environmental impacts of any proposed action that includes federal money or affects federal land and public input in relevant decisions.
National Register of Historic Places (NRHP)	The National Register of Historic Places (NRHP) is the official federal list of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture. Properties listed or eligible for listing in the NRHP meet defined criteria and are significant to the history of their community state, or the nation.
Noise abatement criteria	Noise levels measured in decibels that are used as a basis of comparison for evaluating the impact from predicted design year noise and for determining whether noise abatement measures should be considered.
Noise receptor	Locations that may be affected by noise.
Non-jurisdictional wetland	Wetlands not under the jurisdiction of the U.S. Army Corps of Engineers. See Jurisdictional Wetland .

Term	Definition
Noxious weeds	<p>An alien plant or parts of an alien plant that have been designated by rule as being noxious or has been declared a noxious weed by a local advisory board, and meets one or more of the following criteria:</p> <ol style="list-style-type: none"> 1. Aggressively invades or is detrimental to economic crops or native plant communities; 2. Is poisonous to livestock; 3. Is a carrier of detrimental insects, diseases, or parasites; and 4. Is detrimental to the environmentally sound management of natural or agricultural ecosystems due to the direct or indirect effect of the presence of this plant.
Out-of-direction	<p>Out-of-direction travel occurs on a trip that includes a route that points away from their destination, due to connectivity or road closure circumstances.</p>
Peak hour	<p>The hour in which the maximum traffic demand occurs on a roadway facility. On most roads during weekdays, higher traffic volumes occur in the morning and in the evening because of work-related trips.</p>
Ramp meter	<p>A traffic signal located at the on-ramp to a highway to control the flow rate of vehicles entering the highway. A ramp meter controls the frequency and spacing of merging vehicles, which helps to improve the traffic flow on the highway.</p>
Regulated materials	<p>The generation, storage, disposal, and release of any hazardous substance or petroleum product that falls within the scope of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA). Properties contaminated by hazardous waste or petroleum products, highway accidents that potentially release environmental contaminants into adjacent land and streams; and potential contamination from mine tailings and wastes from historic mines are examples of regulated materials.</p>
Right-of-way	<p>The land owned or acquired for highway operations and maintenance.</p>
Scoping	<p>An early step in the NEPA process that includes seeking agency and public views and information, receiving comments and suggestions, and determining issues to evaluate during the environmental analysis. Scoping can involve public meetings, telephone conversations, or written correspondence.</p>
Screening (alternatives analysis)	<p>A systematic process in which a broad range of alternatives is narrowed down to those that best meet the goals of a project based on the project's purpose and need, as well as focus on key issues and concerns related to the study area.</p>

Term	Definition
Section 106 of the National Historic Preservation Act	Section 106 of the National Historic Preservation Act requires federal agencies to define and document the resources listed on or eligible for the National Register of Historic Places located within the Area of Potential Effects (APE), in consultation with the State Historic Preservation Office (SHPO), to determine the effects of the proposed project on them.
Section 4(f)	Properties that are defined under Section 4(f) of the Department of Transportation Act of 1966 (49 United States Code [USC] 303). Department of Transportation (DOT) regulations explicitly state that the Secretary of Transportation cannot approve the acquisition of publicly-owned land from a park, recreation area, or wildlife refuge, or land from a national, state, or local historic site unless no feasible and prudent alternative exists. These properties are commonly referred to as 4(f) properties.
Section 404	Section 404 of the Clean Water Act requires permits for any discharge of dredged or fill material into the aquatic ecosystem, including wetlands. Impacted ecosystems must be mitigated and monitored according to the Clean Water Act.
Section 6(f)	Properties that are defined under Section 6(f)(3) of the Land and Water Conservation Fund Act signed into law on September 3, 1964. These properties consist of publicly-owned land, including parks and recreation areas, purchased or improved with monies from the Land and Water Conservation Fund, and are intended to remain in use for public recreation in perpetuity.
Sedimentation	The deposition of soil or mineral particles, usually into a water body or drainage.
Seeps	A place where groundwater flows slowly to the surface and often forms a pool; a small spring. Seeps are usually not flowing, with the liquid sourced only from underground. Seeps are often used in environmental sciences to define an exfiltration zone (seepage zone) where contaminated water from waste dumps or other sources leaves a waste system.
Service interchange	A service interchange is an interchange between a freeway or controlled access facility and a lower class roadway such as an arterial or collector road. Main purpose is to provide nearby land access.
Set back	Setbacks form boundaries by establishing an exact distance from a fixed point, such as a property line or an adjacent structure, within which building is prohibited.
Signal priority	Often an element of Bus Rapid Transit (BRT), signal priority is the designing of traffic signals to turn green as transit vehicles approach.

Term	Definition
Sinkholes	A rounded depression in the landscape formed by water slowly dissolving the rock below or, in some cases, when an underground cavity collapses.
Slip ramp	A diagonal ramp, more properly called a cross connection, which connects with a parallel frontage road.
Special management area	Public lands with federal management prescriptions that favor wildlife and their habitats because of limits they impose in some way on human activities.
Split diamond interchange	Where several roads need to be connected to the same freeway, but they are too close together two diamond interchanges are used and connected with one-way frontage roads.
Springs	A natural flow of water discharged to the surface from the ground or from rocks, representing an outlet for the water that has accumulated in permeable rock strata or cave underground.
Stakeholder	An individual, group, or organization who is impacted by the outcome of a project.
State Transportation Improvement Plan	A plan that establishes state transportation spending for a period of six years.
Superfund site	A site contaminated by hazardous waste and identified by the Environmental Protection Agency as a candidate for cleanup because it poses a risk to human health and/or the environment.
Sustainability	Accommodating the needs of the present population without compromising the ability of future generations to meet their own needs.
System interchange	An interchange that connects freeways to freeways.
Threatened and endangered species	A classification of plant and animal species listed in the Endangered Species Act.
Traffic noise model (TNM)	A traffic noise prediction model designed, developed, tested and documented by the Federal Highway Administration.
Transportation System Management (TSM)	Actions that improve the operation and coordination of existing transportation services and facilities, such as ramp metering.
Transportation/Travel Demand Management (TDM)	Programs designed to reduce or shift demand for transportation through various means, such as the use of public transportation, carpooling, telecommuting, and alternative work hours.
TWLT lane	Two-way, left-turn lane. This is a center lane that serves as a left-turn lane for both directions of travel.
Vehicle mile of travel (VMT)	A unit to measure vehicle travel made by a private vehicle, such as an automobile, van, pickup truck, or motorcycle. Each mile traveled is counted as one vehicle mile regardless of the number of persons in the vehicle.
Vehicles per day (vpd)	This is a measure of traffic volume and is used as the unit for Average Annual Daily Traffic.
Vehicles per hour (vph)	The number of vehicle passing a specific point in one hour.

Term	Definition
Viewshed	An area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point, often from public areas such as from public roadways or public parks.
Waters of the U.S.	Section 404 of the Clean Water Act defines waters of the U.S. as all traditional navigable waters and their tributaries, all interstate waters and their tributaries, all wetlands adjacent to these waters, and all impoundments of these waters.
Watershed	The areas that drain to surface water bodies, including lakes, rivers, estuaries, wetlands, streams, and the surrounding landscape.
Wetland	Wetlands consist of areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

